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BRITISH MEDICAL JOURNAL

JOURNAL OF THE BRITISH MEDICAL ASSOCIATION

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BRITISH MEDICAL JOURNAL

LONDON SATURDAY SEPTEMBER 19 1942

ESTIMATION OF HAEMOGLOBIN BY THE ALKALINE HAEMATIN METHOD

BY

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Haemoglobinometry has at present two chief functions—first, the detection of diseases characterized by deficiency or excess of haemoglobin; secondly, the study of changes in haemoglobin concentration caused by loss or gain of plasma. For both purposes it is desirable that the method employed should estimate the concentration of all the forms of haem-pigment circulating in the blood. Ammundsen (1939, 1941) has shown that under modern conditions a normal adult may have from 2 to 12% of his total haemoglobin circulating in an inactive form. The inactive fraction is chiefly composed of carboxyhaemoglobin, methaemoglobin, and sulphaemoglobin. Drugs of the sulphonamide class often increase the proportion of inactive haemoglobin in patients receiving this form of treatment. Most methods of estimating haemoglobin are standardized by reference to determinations of the oxygen-carrying power of blood. These yield valuable information concerning one important function of the blood, but they may provide a false picture of the pigment metabolism, since they take no account of inactive haemoglobin which may be capable of regeneration to the active form. They may imply the presence of anaemia where none exists. Several methods of estimation are in general use, and it is pertinent to inquire not only into the accuracy of each but also if total pigment or merely active haemoglobin is being measured.

The Haldane method enjoys a wide popularity, yet, being based on the gas (CO)-carrying power of blood, it may not measure total pigment. Samples of blood are frequently encountered in which the colour is not comparable with the standard; this is probably due to the presence of a large amount of inactive haemoglobin which is not convertible to carboxyhaemoglobin. The standards available commercially are often unreliable and may quickly fade. In addition the method requires a source of carbon monoxide.

There are several acid haematin methods in use, of which the most familiar are the Sahli and Newcomer. Several disadvantages are common to them all. The colour developed by the test does not quickly reach a maximum; while most of it develops in the first 30 or 40 minutes, the greatest optical density is not reached for from 24 to 36 hours, and the velocity of the colour reaction is not constant. Some observers claim the colours are not easily matched and that there is a high degree of personal error: according to Heilmeyer and Von Mutius (1938) this may be as high as ± 10%. Wu (1922) has shown that the colour developed depends upon the concentration of protein and lipoid in the test; and, since acid haematin is insoluble and exists as a colloid suspension protected by the protein present, there is often turbidity or actual precipitation.

The pyridine haemochromagen method of Roets (1940) [cf. Rimington, 1942] depends on the following principle. Haemoglobin in the sample is converted by sodium hydroxide, pyridine, and sodium hydrosulphite into pyridine haemochromagen. The standard is crystalline haemin, which is converted to the haemochromagen with the same reagents. The two solutions are compared colorimetrically and the concentration of haemoglobin in the test is calculated on the assumption that each milligramme of iron in the haemin standard is exactly the equivalent of a milligramme of haemoglobin iron in the test. This method has the advantage of a standard which is readily reproducible, and in addition it measures total pigment; but most pathologists would probably agree that pyridine, because of its extremely objectionable odour, is an unsuitable reagent for use in a routine clinical laboratory.

Recently we have been searching for some method of haemoglobin estimation which fulfils the following criteria. It must measure total pigment with a reasonable degree of accuracy and yet be simple enough to be employed in a laboratory where many determinations are performed daily. Measurement must be in terms of some simple easily reproducible standard so that the results at one laboratory may be directly comparable with those obtained in another. This standard must be either haemoglobin or some other substance with constant properties which may be referred to haemoglobin. From a review of the literature we decided that the most likely procedure was the alkaline haematin method of Wu (1922), which is recommended by Peters and van Slyke (1932). Wu found that the acid haematin method of Cohen and Smith (1919), the CO method of Palmer (1918), the methaemoglobin method of McEllroy (1920), and the cyanhaemoglobin method of Stadie (1920) gave divergent results with sheep's blood, but that if the test solutions were all rendered alkaline before the colorimetric readings were made the differences largely disappeared. The acid haematin method applied to solutions of pure haemoglobin gave lower results than those obtained when plasma was added. The errors increased with increasing amounts of plasma, but were not proportional to the plasma present. With solutions of washed red cells the reverse was the case: added plasma decreased the apparent observed concentration of haemoglobin. These extraordinary effects, probably due to the colloidal nature of haematin in the acid medium and of proteins and fats from the plasma, were abolished by the

addition of excess sodium hydroxide to the test solutions. Haematin exists in true solution in alkaline solutions of *p*H 10 and over, and plasma proteins and fat are likewise much better dissolved by alkali than by acid. The presence of variable amounts of the abnormal forms of haemoglobin (CO-, met-, cyan-), moreover, exerted a pronounced effect on the acid haematin method, but no effect when the solutions were made alkaline, the same amount of alkaline haematin being produced from any form of haemoglobin or from mixtures of them. The alkaline haematin method of Wu, then, appeared to satisfy our criteria of reasonable accuracy, of simplicity, and of measuring all forms of haemoglobin.

The majority of the standards in use for the different methods of haemoglobinometry are prepared from blood. This is a grave disadvantage, as the blood needs careful standardization by the oxygen capacity method, a procedure which requires elaborate apparatus and a skilled technique and which is difficult for those who are not experienced in gas analyses. The standards prepared from blood are, moreover, not easily preserved, and frequent restandardization is necessary. Because of these difficulties there has been a wide-spread adoption of coloured glass standards, but these have proved unsatisfactory because of lack of uniformity and of the failure to give an equally good match of the haemoglobin colours in light from different sources. The alkaline haematin method carries the great advantage that a simple reproducible standard can be prepared from crystalline haemin, a substance which is easy to prepare and which can be weighed out in equal amount and dissolved in soda by any worker to give standards of identical colour value.

Haematin Standards

Thirteen samples of crystalline haemin have been prepared by slightly different methods from ox and human bloods.[1] The iron content of each sample was determined and the results are shown in Table I. Solutions of alkaline haematin containing

TABLE I.—*Specific Extinction Coefficients of Various Preparations of Haemin**

No.	Blood Used	% Fe	Analyst	Method of Analysis	Es† (for 1 mg. Fe/100 c.cm.)	Es‡ (for 1 mg. Fe/100 c.cm.)
1	Ox	8·55	Weiler and Strauss	"Micro Fe_2O_3"	0·764	0·768
2	Ox	8·29	Geochem. Labs.	$TiCl_3$	0·782	0·786
		8·28	Delory	,,		
3	Human	8·53	Weiler and Strauss	"Micro Fe_2O_3"	0·752	0·768
4	,,	8·45	Delory	$TiCl_3$	0·760	0·752
5	,,	8·21	,,	,,	0·779	0·766
6	?	7·81	,,	,,	0·793	0·800
7	Human	8·29	,,	,,	0·769	0·757
8	,,	8·26	,,	,,	0·786	0·771
9	,,	8·18	,,	,,	0·752	0·758
10	,,	8·50	,,	,,	0·756	0·748
11	,,	8·45	,,	,,	0·766	0·759
12	,,	8·32	,,	,,	0·762	0·753
13	Washed cells	8·40	,,	,,	0·775	0·764
				Mean =	0·769	0·766
				Standard deviation (corrected) =	0·009	0·014
				Coefficient of variation =	1·18%	1·83%

* 10 mg. (approx.) per 100 c.cm. solution in N/10 NaOH. Two-stage Leitz compensating colorimeter; mercury-green illumination; 1·01 D Ilford neutral grey screen, average depth of solution 15 mm.
† Average of 3 separate determinations by 3 observers.
‡ Determined in photo-electric colorimeter (King, 1942), Chance green filter. The extinction coefficients re-determined on these same solutions 6 months after their preparation were identical with those shown.

approximately 10 mg. of haemin per 100 c.cm. were prepared and the specific extinction coefficients of the solutions measured. The mean of the 13 samples is 0.769, with a standard deviation of 0.009 and a coefficient of variation of 1.18%. Three other samples, one prepared in bulk by B.D.H. and two kindly supplied by Dr. R. G. Macfarlane of Oxford, agree closely with the results in the table. These solutions, which have remained stable for over six months, obey the Beer-Lambert law. Clearly when alkaline haematin is prepared from crystalline haemin the intensity of the colour developed is proportional to the concentration of iron in the sample.

Alkaline Haematin Method Applied to Blood

When adult human blood is added to decinormal sodium hydroxide a brown colour is quickly developed which on spectroscopic examination contains the specific absorption band of alkaline haematin (607 mμ). Blood taken from infants develops this colour much more slowly owing to the fact that the foetal type of haemoglobin is more resistant to alkaline denaturation. Brinkman and Jonxis (1935) have shown that the foetal type of haemoglobin steadily diminishes after birth and is absent at 7 months; at about 3 years another type of alkali-resistant haemoglobin appears, and persists throughout life. This adult resistant haemoglobin occurs only in small concentrations and the main bulk of adult haemoglobin has little resistance to alkali. The rate of alkali denaturation of all forms is markedly accelerated by increasing the *p*H and the temperature. We have investigated the rate at which alkali denaturation becomes complete in samples containing varying proportions of resistant and inactive haemoglobin.

If a 1 in 100 dilution of umbilical cord blood in N/10 soda is made, the solution remains bright pink, with the absorption bands of oxyhaemoglobin clearly visible for some hours at room temperature. With brief heating the colour change is dramatic, and the oxyhaemoglobin bands are replaced by those of alkaline haematin. The effect of heat was studied by making a 1 in 100 dilution of umbilical cord blood and placing it in a boiling-water bath. Aliquots were removed at various intervals and promptly cooled under the tap before being compared in a colorimeter with a standard alkaline haematin solution. It was found that the colour reaction, often complete after 2 minutes in the bath, was invariably so after 5 minutes. For a further short and variable time the colour remained constant, but turbidity developed later, giving an apparent increase in colour. No significant turbidity was detected after only 5 minutes in the bath (Table II).

TABLE II.—*Effect of Heat on Alkali Denaturation of Foetal Type Haemoglobin*

Time of Heating	Blood A	Blood B	Blood C	Blood D
Before heating ..	0·50*	0·43*	0·88*	0·60*
2 minutes	0·318†	0·285†	0·670†	0·455†
5 ,, ...	0·308†	0·285†	0·662†	0·440†
10 ,, ...	0·310†	0·285†	0·680‡	0·440†
15 ,, ...	—	0·330‡	0·710‡	0·463‡

* Still pink. † Clear brown. ‡ Turbidity.
The figures represent the extinctions E read in the King (1942) photo-electric colorimeter, Chance green filter.

Many observations were made on hospital patients to determine if any appreciable concentration of resistant haemoglobin might be encountered. 0.05 c.cm. of blood was added to 5 c.cm. of N/10 soda. After this unheated solution had been compared with a standard solution it was allowed to stand overnight, when the comparison was repeated. In many cases there was no significant difference between the two observations, but in some adults and all infants the overnight reading

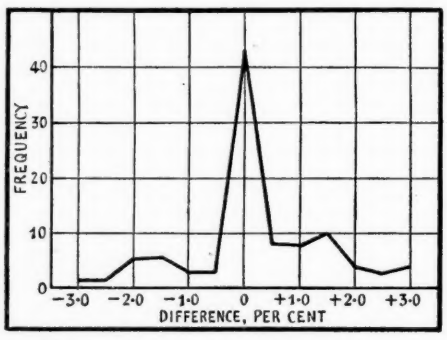

FIG. 1.—Difference in colour of blood in N/10 NaOH produced by heating for 5 minutes and by standing overnight at room temperature.

was significantly lower than the initial reading—i.e., the change from pink to brown was not complete in the few minutes before the first reading.

The effect of heating all specimens was then studied, 0.1 c.cm. of blood being added to 10 c.cm. of N/10 soda and the specimen divided. One-half of each test was placed in the boiling-water bath for exactly 5 minutes, cooled under the

[1] The methods of preparation and of iron analysis are published elsewhere (Delory, 1942).

tap, and compared with the standard haematin solution. The other half was allowed to stand overnight and also compared with the standard. Fig. 1 is a distribution curve of 100 consecutive observations on 96 patients and 4 specimens of umbilical cord blood. No observation falls outside the limits of 3% of the same reading, 91% of cases are within 2%, and in 43% of cases the observations are identical. The mean overnight reading is 100.285 of the 5-minute reading, and the standard deviation is 1.72.

A comparison was next made of a series of alkaline haematin values produced by 4–5-minute heating in sodium hydroxide with those developed by Wu's procedure—i.e., a 40-minute treatment of the blood with N/10 hydrochloric acid at room temperature followed by the addition of excess sodium hydroxide. Table III shows the close agreement of the two

TABLE III.—*Comparison of Haemoglobin Results by Different Haematin Methods. (Figures represent % of Haden Normal; Consecutive Routine Examinations.)*

Alkaline Haematin Methods		Acid Haematin Method	Alkaline Haematin Methods		Acid Haematin Method
Present Method*	Wu's Method†		Present Method*	Wu's Method†	
%	%	%	%	%	%
42	41	46	36	36	40
69	70	67	40	39	45
84	84	80	53	53	61
83	84	87	74	73	87
88	87	81	84	83	89
91	89	89	80	80	81
83	86	81	83	83	85
86	86	84	37	37	41
56	55	57	88	88	92
76	76	78	76	76	80
25	23	36	51	51	58
43	43	45	77	77	80
55	56	57	59	59	64
57	57	61	76	76	78
48	48	54	94	95	95
80	81	82	55	55	54
83	83	85	72	73	76
70	70	68	84	84	87
47	46	52	72	73	76
66	65	81	90	90	92
73	72	71	55	56	58
74	74	80	29	30	34
79	78	82	98	98	96
32	31	31			

* 0·05 c.cm. blood in 5 c.cm. N/10 NaOH, heated 5 minutes.
† 0·05 c.cm. blood in 4 c.cm. N/10 HCl, let stand 40 minutes, made alkaline with 1 c.cm. N/1 NaOH.

alkaline haematin methods, and the discrepancies between them and the acid haematin procedure.

From these experiments it seems clear that the same final alkaline haematin colour is developed equally well either by treating the blood directly with soda and heating or allowing to stand at room temperature for many hours, or by an initial treatment to convert the haemoglobin into acid haematin followed by the addition of soda to render it alkaline.

To study the effect of inactive haemoglobin it is necessary to subject the sample to considerable manipulation with increased opportunity for introducing sampling errors. To reduce these as far as possible normal blood was lysed with water and filtered, the resulting solutions being much easier to handle than whole blood. Table IV indicates the steps

TABLE IV.—*Colour Produced by Different Forms of Haemoglobin when Estimated by the Alkaline Haematin Method*

Solution	Untreated	As COHb (gassed for 30 min.)	As Sulph-Hb (H_2S passed for 10 min.)	As Met-Hb (Treated with Pot. Ferricyanide)
1	0·168	0·162	0·171	0·162
2	0·199	0·204	0·205	0·199
3	0·544	0·548	0·536	0·536
4	0·376	0·376	0·374	0·388
5	0·346	0·336	0·347	0·339

(Figures represent extinctions E, photo-electric colorimeter, Chance green light filter.)

taken to convert the haemoglobin into inactive forms, and also shows that they are quantitatively converted to alkaline haematin by heating for 5 minutes in the water-bath. This experiment confirms the finding of Wu, that the different forms of haemoglobin are quantitatively determined when estimated by the alkaline haematin method.

Likewise, the addition of plasma either to the haemin standard or to tests prepared from blood had little or no effect. Plasma added in amount equal to the volume of blood taken—i.e., 0.05 c.cm. in 5 c.cm. of soda—caused no measurable change in many cases, and in others the change was of the order of 1% increase. The most pronounced effect observed was a 2% increase in optical density due to adding a turbid specimen of plasma.

Relation of Colours Produced from Haemin and from Haemoglobin in Sodium Hydroxide

From theoretical considerations it now seemed possible to equate solutions of alkaline haematin derived from haemin and from blood on the assumption that one milligramme of iron in the haemin standard would be equivalent to one milligramme of iron in the haemoglobin test. Attempts to apply this assumption to the clinical estimation of haemoglobin showed that bloods examined in this way yielded results by the alkaline haematin method which were higher than could be justified either by the clinical condition of the patient or

TABLE V.—*Haemin Iron Equivalent of Oxygen Capacity*

Subject	Oxygen Capacity (c.cm./100 c.cm. Blood)	Fe eqv. (mg.)	Fe found by Comparison with Haemin (mg.)	Found Fe as % of O_2 eqv. Fe
S (human) ..	11·94	29·8	39·5	132
N " ..	19·75	49·4	65·1	132
B " ..	18·27	45·7	55·6	122
N " ..	19·45	48·6	63·6	131
M " ..	19·8	49·5	63·6	128
T " ..	20·3	50·7	61·7	122
R " ..	19·9	49·7	63·6	128
D " ..	23·0	57·5	69·5	122
F " ..	22·2	55·5	68·5	123
Horse ..	20·1	50·2	63·5	127
			Average =	127

1 atom Fe (56 g.) ≡ 1 mol O_2 (22·4 l.)
1 mg. Fe ≡ 0·4 c.cm. O_2

by examination of the stained blood film. In a small series of hospital cases venous blood samples were analysed for haemoglobin by the alkaline haematin procedure and for oxygen capacity with the van Slyke manometric apparatus by Dr. J. McMichael. The results obtained by the haematin method were uniformly about 30% higher than the oxygen

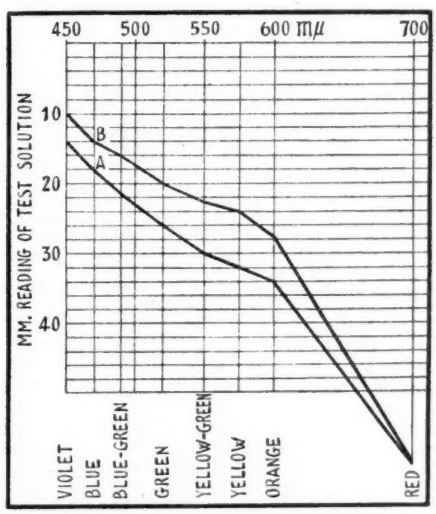

FIG. 2.—Light-absorption curves of haemin in sodium hydroxide (A) and of haemoglobin heated in sodium hydroxide (B); Ilford spectral filters, neutral grey screen, Duboscq colorimeter.

capacity—a far greater difference than could be accounted for by the presence of small amounts of inactive haemoglobin in the normal blood samples investigated.

The colour of alkaline haematin derived from blood had been assumed to be identical with that derived from haemin,

but these results suggested that this was not the case. Although the colours were similar to the unaided eye, and had the same broad band at 606 to 608 mμ when viewed in the Hartridge reversion spectroscope, they showed a slight dissimilarity in absorption in the red. Solutions derived from each source were examined in a colorimeter against a neutral grey screen, using a range of light filters covering the visual spectrum. The absorption curves are plotted from these data in Fig. 2, which indicates that the colours differ slightly in the red portion of the visual spectrum.

Several samples of human haemoglobin were then prepared by precipitation with alcohol as described by Delory (1942). By this method large yields of dried human haemoglobin were readily obtained in a semi-pure state. An iron analysis of quantities of about 1 g. was performed in duplicate on each sample. As in the case of haemin, solutions of alkaline haematin were prepared by dissolving the haemoglobin in N/10 soda. The extinction coefficient was measured and the absorption curve studied. This was found to agree with that derived from blood and to differ in the same way from that of haemin. The solutions were compared with solutions of haemin in N/10 soda and the ratio of colour intensity per mg. of iron in each solution calculated. In each case this ratio was found to be close to the mean of 1.32 for the five samples (Table VI).

TABLE VI.—*Colour of Various Haemoglobin Preparations*

Haemoglobin Preparation No.	% of Iron	Es*	Hb/Haemin Colour Ratio†
1 (human)	0·262	1·03	1·29
2 ,, ...	0·284	1·00	1·32
3 ,, ...	0·278	0·97	1·33
4 ,, ...	0·284	0·98	1·32
5 (ox)	0·249	1·00	1·33

* Es = specific extinction coefficients for 1 mg. haemoglobin Fe/100 c.cm. Photo-electric colorimeter, Chance green filter.
† Colour of haemoglobin solutions against a single haemin standard.

It appears, therefore, that although the brown colours produced in sodium hydroxide from blood and from crystalline haemin are seemingly the same on visual inspection and are similar over most of the visual spectrum, they are not in fact identical. There is a quantitative discrepancy of approximately 30% and a slight qualitative difference. The chemical reasons for the discrepancy are beyond the scope of this paper; suffice it to say that it can be adequately explained by the fact that the alkaline haematin solutions derived from haemoglobin and blood contain both haematin and globin, whereas that prepared from haemin contains only haematin and no globin. Haemin, then, cannot be used as a theoretical standard in the sense that four molecules of haemin should give the same colour as one molecule of haemoglobin. But it can be employed perfectly satisfactorily as an artificial standard. The colours produced by haemin and haemoglobin in soda are similar to the eye in any light,* and in green light they are easily and accurately matched and there is a constant ratio of colour intensity by whatever means the reading is made.

Methods for the Determination of Haemoglobin by the Alkaline Haematin Procedure

The brown colour of blood in sodium hydroxide solution is compared with that of a solution of crystalline haemin of known iron content.

Method 1.—0.05 c.cm. of blood is diluted to 5 c.cm. with N/10 NaOH, heated in a boiling-water bath for 4 to 5 minutes, cooled, and read against the haemin standard in a suitable colorimeter (Duboscq, photo-electric, etc.), using a green light filter.

Method 2 (Method of Wu; cf. Peters and van Slyke, 1932).—0.05 c.cm. of blood is treated with 4 c.cm. of N/10 HCl, left at room temperature for 40 minutes, and then diluted to 5 c.cm. with N/1 NaOH.

Standard.—The haemin-iron equivalents of the "100% normal" standards are shown in Table VII. An amount of haemin of known iron content, which is the equivalent of the desired standard, is accurately weighed and dissolved in 1 litre of N/10 NaOH. This solution should be preserved in a glass-stoppered bottle in a cool dark place. Kept under these conditions our standards have remained unaltered for 9 months.

Authorities differ as to the percentage of haemoglobin in blood which they regard as a normal figure. The three most commonly used are given in Table VII. There is an increasing body of evidence to show that Haldane's (1900) figure of 13.8 g. of haemoglobin is too low and that the Haden (1922) value of 15.6 g. per 100 c.cm. (20.9 c.cm. O_2) is a more normal figure (cf. Peters and van Slyke, 1932; Wardlaw, 1941). This is the figure we have used and which has seemed adequately to represent our normal healthy cases; it has given colour indices averaging unity for healthy persons and treated anaemias.

TABLE VII.—*Concentrations of "Normal" Blood Standards*

	Haldane	Haden	Sahli
g. haemoglobin/100 c.cm.	13·8	15·6	17·2
O_2 capacity (c.cm./100 c.cm.)	18·5	20·9	23·0
mg. Fe/100 c.cm.	46·2	52·2	57·6
Alkaline haematin equivalents: mg. Fe/100 c.cm.* .. .. .. (i.e., haemoglobin Fe × $\frac{1·3}{100}$)	0·60	0·68	0·75
Pure haemin, 8·57% Fe (mg. per litre)* ..	70·0	79·4	87·5

* Which give the same colour as blood diluted 1 in 100 in N/10 NaOH.

The alkaline haematin standard we use for routine is weaker than the "100%" standards. It contains an amount of haemin representing 0.45 mg. of iron. This solution matches any haemoglobin solution or blood containing 10.3 g. of haemoglobin per 100 c.cm. when treated with sodium hydroxide to give a dilution of 1 in 100. This standard was chosen because it is close to the average of the concentrations most often encountered in hospital practice. Its relation to the "normal blood" standards is shown in Table VIII. Haemin standards of "100% normal" may of course be used. The figures for these are given in Table VII. The method has now been in use for several months and has proved most satisfactory. Where many determinations are undertaken it is more rapid and more accurate than other methods we have used.

TABLE VIII.—*Alkaline Haematin Standard for Routine Use with Duboscq and Photo-electric Colorimeters*

52.5 mg. of pure haemin (or an equivalent amount of other haemin of known Fe content) is dissolved in 1 litre of N/10 NaOH. This solution contains 0.45 mg. Fe/100 c.cm. and is equal in colour to:

75% of Haldane normal
66% of Haden ,,
60% of Sahli ,,

when blood is diluted 1 in 100 in NaOH.

Approximate Methods

With the Lovibond Comparator.—Through the co-operation of Mr. G. S. Fawcett a Lovibond disk has been prepared to match the alkaline haematin colours. The values are spaced at 10% of the Haden normal—i.e., at differences of 1.56 g. haemoglobin per 100 c.cm. The blood is treated by either of the above procedures, the test-tube is placed in the Lovibond comparator, and the disk is rotated until a colour match is obtained. By careful comparison it is possible to gauge colours intermediate between those in the disk and hence to read the haemoglobin to within about 5%.

With the Hawksley Dilution Colorimeter.—The small dilution haemoglobinometer supplied by Messrs. Hawksley for the Sahli method is easily adapted by the substitution of the coloured glass standard by a tube of alkaline haematin solution (equal to 100% of normal—e.g., Haden). 0.02 c.cm. of blood is added to a little N/10 soda in a calibrated dilution-tube; the mixture is warmed until it is of a clear light-brown colour, and is then diluted by the dropwise addition of N/10 NaOH, with mixing, until a colour match is obtained. The percentage

* The slight qualitative difference in the colours may be apparent if they are viewed through too great a depth of solution. Thus a "100%" blood and the standard will appear identical in 1/4-inch dilution-tubes, but the colours will appear slightly different in wide test-tubes. On the other hand more dilute solutions of haemin and haemoglobin appear identical even when viewed through wide tubes.

is read from the scale on the test-tube. If this method is employed care should be taken to ensure that the tubes used are properly calibrated and of the same diameter.

Summary and Conclusions

The haem-pigments circulating in the blood may be divided into an active fraction, reduced and oxyhaemoglobin, and an inactive fraction chiefly carboxyhaemoglobin and methaemoglobin. A satisfactory method for estimating haemoglobin should measure both fractions.

The Haldane and acid haematin methods may not measure total pigment with the degree of accuracy desirable. Commercial standards are often unreliable and may fade. The pyridine haemochromagen method is rejected because of the objectionable nature of the reagents employed.

Criteria of a satisfactory method are described. These include the measurement of total pigment, reasonable accuracy, simplicity, the use of non-toxic reagents, and some permanent easily reproducible standard.

The alkaline haematin method of Wu eliminates errors which arise in the acid haematin procedure due to lipids, the colloidal nature of acid haematin, and the presence of inactive haemoglobin. Alkaline haematin has the advantage of being a true solution and is easily prepared both from haemoglobin and from crystalline haemin. Haemin is easy to prepare in a pure state from haemoglobin, and its iron content may be estimated with accuracy. Thus it appeared to satisfy our criteria for a suitable standard, and was investigated for this purpose.

Sixteen samples of crystalline haemin were prepared from ox and human bloods and the iron content of each determined. Solutions of alkaline haematin were prepared from each sample. The specific extinction coefficients were found to agree closely. The intensity of colour was proportional to the concentration of haemin iron, and impurities failed to influence the colour.

Several forms of haemoglobin occur in normal blood, some of which are resistant to alkali denaturation. Whatever the proportion of alkali-resistant haemoglobin in a blood sample, if a 1 in 100 dilution in decinormal soda is prepared and placed in a boiling-water bath for five minutes all the haemoglobin is converted into alkaline haematin.

Similar treatment converts all inactive forms of haemoglobin into alkaline haematin. The colour developed is not significantly influenced by the amount of lipoid or plasma in the sample.

Determinations of haemoglobin in blood samples based on the assumption that 1 mg. haemin iron in the standard was equivalent to 1 mg. haemoglobin iron in the test yielded results uniformly about 30% higher than determinations based on the oxygen-carrying power of the same sample. It was then found that solutions prepared from haemin and blood gave colours whose absorption curves differed slightly in the red portion of the spectrum.

Samples of human and ox haemoglobin were prepared and their iron content determined. Solutions of alkaline haematin were prepared from each sample and their specific extinction coefficients and absorption curves determined. The curves derived from the haemoglobin solutions were identical with that from blood, and the colour produced was 30% higher than would be anticipated from the iron content, when compared with haemin standards.

Thus haemin is not a theoretical standard in the sense that four molecules of haemin should give the same colour as one molecule of haemoglobin; but it can be employed satisfactorily as an artificial standard. The colours of the solutions are almost identical in the concentrations used for the test, and are matched with ease and accuracy. The standard appears to be unchanged during several months.

Details of methods for the estimation of total haemoglobin using haemin as a standard are given, together with instructions for the preparation of standard solutions equivalent to 100% of the Haldane, Sahli, and Haden scales.

We have employed this method for many months and have found it to give excellent results. Where many determinations are made daily it is quicker and more reliable than other methods we have used.

Our thanks are due to Dr. R. G. Macfarlane of Oxford and Dr. J. M. Peterson of Cardiff, who have carried out independent investigations of the alkaline haematin method, for helpful discussions and advice; to Mr. G. E. Delory for his invaluable assistance with the iron analyses; to Dr. J. McMichael for the estimations of O_2 capacity; to Mr. G. L. Widd for his assistance in comparing the alkaline and acid haematin methods; and to Dr. G. A. D. Haslewood for valuable advice.

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LOUSE-BORNE TYPHUS FEVER

BY

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AND

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(From a Prison Camp in Germany)

The articles on this subject that appeared in the *British Medical Journal* of Dec. 6 and 20, 1941, have induced us to record our observations on a series of 21 cases occurring in a prison camp in Germany, of which 3 (14.28%) were fatal; 16 (76.18%) arose in men employed in handling clothing at the camp disinfector. In only 2 cases was it possible to determine the incubation period, and this was in accordance with the usual period of 12 to 14 days.

Onset

The illness was in some cases ushered in by severe frontal headaches, shivering, occasionally epistaxis, soreness of the throat, and thirst, followed by a general feverish feeling, like influenza. In milder cases, on the other hand, the patients felt quite well during the first 3 or 4 days in spite of their temperature being in the region of 102° F.

One patient gave a history of an attack of influenza for one day. He felt better the next day, but was cold and shivery; on the fourth day he suddenly developed acute abdominal pain, vomited twice, and was admitted to hospital as a case of acute appendicitis. His temperature was 102.2°, and his pulse 100; his urine contained nothing abnormal. A laparotomy was performed and the next morning his temperature and pulse fell to normal, but the same evening they rose to 102.9° and 112 per minute respectively, and remained about this level. On the third day after his operation the rash appeared—i.e., 6 days after his initial attack of influenza.

General Appearance immediately before Occurrence of Rash.—The conjunctival vessels were injected and the eyes assumed a heavy appearance reminiscent of measles without photophobia and lacrimation. The face was flushed and a dusky tinge or distinct cyanosis was present in the skin. The tongue was dry and thickly coated with white or brownish-white fur. Sordes of the mouth was very marked until frequent cleansing was adopted. The facial expression was worried, with a continual frown which was aggravated by questioning or outside interference. Speech was sluggish, and the patients appeared to have difficulty in expressing themselves. In some cases there was delirium immediately before the appearance of the rash, and all became increasingly drowsy. Acute dyspnoea usually occurred towards the end of this phase, and was suggestive of bronchopneumonia with only a few crepitations in the lungs.

The Rash: Character and Distribution

The rash appeared on the average on the sixth day; the shortest period was 5 days and the longest 10. It consisted of pink papulo-macules which later became bluish-red and slaty-blue in colour. It first appeared on the shoulder areas, back and front, especially in the neighbourhood of the axillary folds, on the upper abdomen, and on the flanks, and later it showed on the rest of the trunk and the limbs. It was especially prominent on the forearms, the backs of the hands, and the dorsal surfaces of the feet, and was to be clearly seen on the thenar eminences of the hands and on the medial aspects of the soles of the feet. In 4 (19%) cases the rash appeared on the frontal and temporal aspects of the face. As the macules started to fade subcuticular mottling made its appearance and persisted for about 4 weeks. In 9 (42.8%) cases the rash became petechial 2 or 3 days after the appearance of the macules, and involved the same areas. In one case the petechiae were extremely profuse and generalized; the mucous membrane of the mouth was involved and there was a large subconjunctival haemorrhage. In some cases the petechiae became confluent, over the pressure areas of the shoulders, heels, and sacrum, to form areas of ecchymosis. Later, in spite of precautions, some of these areas formed deep-seated gangrenous bed-sores which healed very slowly (one remained incompletely healed after 6 months). In cases in which the petechial rash appeared it was noticed that the illness was much more severe but not appreciably altered in duration.

Fine branny desquamation started towards the end of the third week from all areas in which the rash appeared, and included the face only in cases with a facial rash. Coarse desquamation occurred from the soles of the feet at this time. The desquamation lasted for about 2 weeks. In 5 (23.8%) cases there was no rash, and in those cases the illness was much milder.

The Fever

The fever proper lasted on an average 17 days. It was of a continuous type, between 100.4° and 103.2° F. (axillary). The maximum temperature recorded was 104.7°. The pulse rate was proportionate to the temperature on the whole, but at times it was disproportionately high. The pulse was easily compressible throughout. The respiration rate was markedly increased, and generally fell a day or two before lysis occurred. The fever tended to end by lysis over 3 to 4 days.

In 4 cases a sudden crisis followed by a rise of temperature in 24 hours, which was sustained over 3 to 4 days, did not prove fatal.

Observation of Patients during Febrile Stage.—During the first week of the fever the drowsy-stuporous condition increased daily. It became more difficult to rouse the patients; they were very restless, slept little, and their resentment of interference of any kind became more marked. Speech became more hesitant and incoherent; low muttering delirious bouts were frequent, and towards the end of the week the patients were semi-comatose. The duskiness and cyanosis of the skin increased in intensity and the respiration became more laboured. The tongue remained dry and furred, and it was difficult to get patients to drink although they complained of thirst. In the second week they passed into a state of coma vigil, in which they lay with open eyes, taking no notice of their surroundings although they still resented interference. At this phase the lips and the tongue were very tremulous, and the latter was difficult to protrude, this being done in a very slow jerky manner. In some cases the tongue appeared to be diminished in size and in 2 cases it was definitely shrivelled and almost black. The patients were becoming progressively more prostrate and their mental state was seldom lucid. Towards the end of the second week they seemed brighter, the tongue became moist, began to clean from the tip and edges, and was protruded more easily and less jerkily. The cyanotic tinge started to disappear and the respiration rate began to fall. The patients then had short periods of mental clarity during which they would ask to micturate, whereas they had previously been incontinent. During the first half of the third week the temperature and pulse rate fell by lysis and there was a marked day-to-day improvement in their condition. There was no abrupt passage from the stage of nervous excitement to that of defervescence. After the defervescence the patients were very emotional; they continued to have bouts of delirium and transient delusions, and were disinterested in and unnoticing of their surroundings and fellow patients until convalescence was well established.

Systemic Manifestations

Alimentary System.—Only in one case was the rash seen on the buccal mucous membrane, and there were no cases of parotitis. The fauces were slightly injected at the onset of the illness. Nausea was frequently complained of early, and vomiting was met with occasionally. Constipation was the general rule, but in 3 cases diarrhoea occurred at the end of the first week. Faecal incontinence was not uncommon during the second week. Abdominal pain occurred, and was so severe in one case that a laparotomy was performed (see above).

In 4 other cases suprapubic pain was associated with difficulty and pain on passing urine.

Respiratory System.—Marked dyspnoea with stertorous breathing and employment of the alae nasi occurred in all cases, and there was a short period of Cheyne-Stokes respiration just before the defervescence. There were 2 cases very suggestive of bronchopneumonia, but the only signs elicited in the others were a few isolated crepitations.

Cardiovascular System.—The pulse was easily compressible throughout the febrile stage, and one case exhibited pulsus paradoxus. The heart sounds became weaker as prostration became more marked, but there was no cardiac enlargement, no murmurs were detected, and no oedema occurred. The blood pressure was not influenced except in one patient, who developed a hypertension of between 180/90 and 190/110 during early convalescence; this still persisted after 6 months with clear urine, but is now resolving.

Eyes.—All cases showed the marked injection of the conjunctival vessels and the heavy appearance already described. Subconjunctival haemorrhages were seen in 2 cases, and one of them showed a small superficial retinal haemorrhage. During convalescence one patient complained of "spots in front of his eyes," and examination revealed recent translucent opacities of the vitreous. These were still present after 6 months. One patient complained of blurring of vision, and definite swelling of the disk was found on both sides. He subsequently made a complete recovery. Prior to defervescence in some cases, the pupils became constricted, but not to pin-point proportions, and showed sluggish reaction to light and accommodation. Several of the patients complained of diplopia, and transient squinting was noticed.

Ears.—Transient deafness was often experienced. In one case severe tinnitus and deafness persisted until 2 weeks after defervescence and then gradually cleared up. In another case severe vertigo, with the patient falling to the left, occurred, and still persists after 6 months.

Central Nervous System.—The mental condition has already been described, but again it must be stressed that the improvement with defervescence was not so dramatic as one would expect from the textbook descriptions. Cerebral irritation was indicated by muscular twitching of varying degree in 16 cases (76%). This variation extended from fine fibrillary tremor of the facial muscles to gross twitching of phalanges, wrist, and ankle-joints, and groups of muscles were observed to contract. It was noticed that the more extensive the petechial change the more marked was the state of nervous excitement.

One patient on the sixth day of illness began to twitch in the muscles of the face and hands and to complain of double vision; by the tenth day he had a mask-like facies, and movement of all muscles was slow, death occurring on the fifteenth day. Another patient developed facial tremor during the second week of the fever; and 3 days before defervescence, which occurred on the twenty-first day, he developed the torpid facies and gross twitching of phalanges, wrist, and ankles; this was almost choreic in type, and was not a peripheral tetany. Prowazeki's and Chvostek's tests were negative, and venous congestion had no effect. There was a pseudo-spasticity of the limbs, the deep reflexes were never more than brisk, the plantars were flexor, and there was no Kernig's sign. The nervous manifestations reached their maximum just before defervescence and passed off during early convalescence, when the patient complained of blurring of vision and was found to have bilateral disk swelling. In his case ulnar neuritis occurred

early in the febrile stage. He complained of severe pain in the little and ring fingers of the right hand, and this settled down to a dull ache and numb feeling; there was no muscle-wasting, and only the loss of the sense of light touch over the little finger, the ulnar half of the ring finger, and the adjacent part of the palm. This still persists after 6 months.

Fine tremor of the fingers was present in all cases during the febrile stage and passed off during early convalescence, when severe neuralgic pains in the feet and legs were complained of.

C.S.F.—Lumbar puncture was not done as a routine but only in those cases with marked cerebral irritation: in all except one case the findings were normal. In the case already described with torpor, Parkinsonism, and disk swelling, the day before defervescence the fluid was clear, and under pressure of 100 c.mm. There were 261 cells per c.mm.—lymphocytes 74%, polymorphs 25%, endothelial cells 1%—and an abnormal increase in globulin.

Genito-urinary System.—All cases had an initial oliguria followed by incontinence. Four patients at the end of the first week, and the others after the defervescence, complained of pain on micturition, having to strain, and a constant desire to micturate without being able to do so. All cases showed albuminuria, red blood cells, epithelial cells, and cellular casts in the urine, which cleared during convalescence; and during the periods of dysuria Gram-negative motile bacilli were found in non-catheter specimens.

Blood Examination.—There was an initial polycythaemia, which may be attributed to the early low fluid intake, to the fluid lost through forceful respiration, and to that lost secondarily by sweating. The haemoglobin percentage and red blood cells fell by from 20 to 30% and from 1½ to 2 millions respectively after the appearance of the petechial rash. In cases with no petechial rash there was not this proportionate fall. The Hb and red cells were quickly made up during convalescence. The white cells varied considerably; the maximum count was 30,200, two were in the region of 18,000, and of the others the highest was 13,000 and the lowest 4,400. Neutrophils constituted 60 to 83% of the count. The granules in the polymorphs appeared to be coarser and more highly stained than the normal. In the 2 fatal cases the counts were R.B.C. 4,600,000, Hb 72%, W.B.C. 4,400; and R.B.C. 4,860,000, Hb 78%, W.B.C. 6,400—taken on the fifth and seventh days respectively. Small extracellular coccal and cocco-bacillary bodies, occurring in pairs and in clusters, violet in Giemsa-stained specimens, were found in a number of the films. These were presumed to be Rickettsia bodies, and were found in one case 6 months after the onset of the illness.

Blood Sedimentation Rate (200-mm. tube Westergren, one hour).—In one case the B.S.R. readings were: 35 two days before rash, 129 three days before defervescence, 83 twelve days after defervescence, 51 nineteen days after defervescence, and 7 three weeks later. In a case with persistent tachycardia the figures were: 2½ months 91, 3 months 94, 3½ months 20, 4 months 38, and 4½ months 22. In the other cases the B.S.R. was not done frequently, but was in single figures in the second week of convalescence.

Laboratory Findings.—The Weil-Felix reaction was positive in all cases tested after the seventh day of fever; in those done on or before the fifth day a negative return was obtained. It was noticed that in the cases in which no rash appeared the titre was lower (1:80 to 1:800) than in petechial cases (1:200 to 1:6400). Successive titre readings could not be made a basis for estimating the severity of the illness, but a rising titre in one case indicated more severe prostration. The Wassermann reaction was frequently positive, but not invariably so, and this test could not be done often enough to be of value. It always became negative after the defervescence. Blood, stool, and urine culture results were negative, but as the specimens were dispatched a considerable distance they were of no value for culturing.

Post-mortem Findings.—In one case ending fatally on the fifteenth day necropsy revealed the cause of death as haemorrhagic bronchopneumonia. The only other significant findings were a marked diminution in body and mesenteric fat, the occurrence of numerous subpleural haemorrhages, and a vivid scarlet coloration in the left lung. The pons and medulla were sent for section, and the translated German report read:

Pieces of Brain Stem.—There are numerous perivascular nodules of polymorphous glial cells in all parts of the brain stem and in the cerebellar cortex. There are changes in the ganglion cells (chromatolysis) and exuberant growth of red cells. Isolated annular perivascular infiltration of lymphocytes and very small haemorrhages. The meninges are infiltrated with lymphocytes, plasma cells, and macrophages. Signs of brain oedema. *Diagnosis*: Typhus meningo-encephalitis.

The histological report suggests a close association with encephalitis.

Treatment Given

Sulphonamides, sulphapyridine, and the ordinary antipyretics were useless. Neither atebrin nor hexamine had any effect on the course of the disease.

The main part of the treatment consisted in giving fluids with glucose *ad lib.*, and when the patient would not, or could not, take them by mouth they were supplemented by the rectal or intravenous route. By this method up to 5 or 6 litres could be given in 24 hours. When prostration was most severe a glucose-saline with 0.00025 g. of strophanthin intravenously resulted in marked improvement. When there was severe cerebral irritation lumbar puncture resulted in an amelioration of symptoms. In one case 50 c.cm. of serum from a convalescent case was injected intramuscularly. The patient improved considerably, but as he had had an intravenous saline and also a lumbar puncture the same day the improvement could not be attributed to any one factor. Cardiac stimulants were given by mouth during the febrile and early convalescent stages. Luminal and scopolamine–eucodal–ephetonine (omnopon–scopolamine) were effective in controlling the acute delirium and insomnia. Tepid sponging was most effective in relieving mental and physical distress. Oral hygiene and care of the skin were insisted on.

As can be seen, the essential part of the treatment consisted of good nursing.

The complications arising consisted of bed-sores, disk swelling (transient), lung abscess (fatal), partial atelectasis, persistent vertigo, persistent ulnar neuritis, and persistent hypertension.

Diagnosis

The problem of diagnosis is an urgent one during the initial phase and in the milder type of case in which there may be no rash. The differential diagnosis has to be made from, for example, influenza, bronchopneumonia, tonsillitis, acute nephritis, enteric fever, meningitis, acute abdomen, acute encephalitis.

Aids to diagnosis are: (1) Occupation. (2) Presence of lice. (3) Severe frontal headache and fever, with failure to respond to ordinary antipyretics. (4) Typical facies with heavy injected eyes. (5) Acute dyspnoea with disproportionate signs. (6) Absence of neck rigidity. (7) Blood picture: polycythaemia with leucocytosis in which the granules are coarser than normal (in enteric there is usually a relative lymphocytosis). (8) The rash, when and if it does appear, is more profuse than in enteric fever. (9) The Weil-Felix test is the deciding factor, and is seldom positive before the appearance of the rash.

Summary

The principal points of interest in this series of 21 cases are:

The occupational association of the "epidemic."

The occurrence of the rash on the face in 19% of cases.

The blood picture: the main features being: (*a*) the initial polycythaemia,* (*b*) the fall in haemoglobin and red cells after the appearance of the petechial rash, (*c*) the occurrence of ? Rickettsia bodies, (*d*) the coarseness of the granules in the polymorphs.

The close similarity between typhus fever and epidemic encephalitis both clinically and pathologically.

The urinary symptoms and findings.

We owe our thanks to Major D. L. Charters, R.A.M.C., ophthalmologist and senior British medical officer, and to Major W. M. Macleod, R.A.M.C., medical specialist, for their helpful advice.

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MANAGEMENT OF RHEUMATIC DISEASE IN THE FORCES

BY

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That the problem of rheumatic disease in the Forces is a considerable one is shown by the fact that out of 2,727 cases seen as out-patients at two military hospitals during the year ended May 1, 1942, 307 were referred because of rheumatism. That is, 1 case out of every 9 was sent up for advice on this account. Just as in peacetime this group of diseases causes great loss of industrial working hours, so, in wartime, rheumatism, though often not severe, interrupts training and disorganizes routine.

It may be of interest to analyse the various groups of cases seen and give a brief account of the treatment adopted and the method of disposal followed. This last is of importance to Service medical officers. Table I summarizes the numbers of each group of rheumatic disease and the percentages admitted to hospital either for further investigation or for treatment.

TABLE I.—*Summary of Cases of Rheumatic Disease in 12 Months at a Military Hospital*

Disease	No.	% of Total Rheumatic Cases	No. Admitted	% of Disease Admitted
Fibrositis	141	52·22	19	13·47
Lumbar	40	14·80	14	35
Trapezial	30	11·10	4	13
Gluteal	26	9·62	—	—
Generalized	18	6·66	—	—
Shoulder girdle	14	5·18	—	—
Intercostal	13	4·81	1	7
Postural backache	40	14·80	12	30
Sciatica	24	8·88	24	100
Osteo-arthritis	24	8·88	7	29
Ankylosing spondylitis	14	5·18	12	85
Rheumatoid arthritis	5	1·85	3	60
Osteochondritis dissecans	5	1·85	1	20
Rheumatic fever	4	1·48	4	100
Infective arthritis	4	1·48	3	75
Gonococcal arthritis	3	1·11	3	100
Sacro-iliac strain	3	1·11	3	100
Spondylolisthesis	1	0·37	1	100
Myositis ossificans	1	0·37	1	100
Gout	1	0·37	1	100
Total	270	100	94	

In 37 cases it was found on examination that there was no evidence of any rheumatic condition. These men were complaining of muscular stiffness after exercise and had labelled themselves "rheumatic" or "arthritic" quite unjustifiably; this diagnosis had been accepted by the unit M.O. Actually the pains were due to the normal physiological response to unaccustomed use of particular muscles. Such men were at an early stage of their training, and it was advised that they should be returned to duty and to normal P.T.

Of the remaining 270 cases 94 were admitted to hospital. The grounds for admission to hospital of men in the Forces suffering from rheumatic disease while they are undergoing training differ widely from the management of civilians in peacetime. Civilians should be treated as out-patients whenever possible so that they can continue to earn a living and avoid the economic anxiety which accompanies hospitalization. With patients in the Services, however, the main purpose must be to render them fit for full duty in as short a period as possible. A soldier with rheumatic disease is of no use in his unit and will usually be stationed too far from a physiotherapy department to be able to attend for daily treatment. In many cases the most rapid way to return the man to full duties is to admit him to hospital, where intensive treatment can be given. Often after a short period in hospital these men are transferred to a convalescent depot where they can continue treatment under P.T. instructors, with the supervision of the Command specialist in physical medicine.

Owing to the type of rheumatic disease encountered in the Services a large proportion can be completely cured, while in the more chronic cases treatment will yield sufficient improvement for the man to be capable of a high degree of efficiency, though in a lower medical category.

Table II summarizes the cases admitted to hospital, their numbers, age, duration in hospital, and disposal.

TABLE II.—*In-patients with Rheumatic Disease during 12 Months*

Disease	No.	Average Age	Average No. of Days in Hospital	Category E
Sciatica	24	29	21	1
Lumbar fibrositis	14	31	16	–
Ankylosing spondylitis	12	28	25	*
Postural backache	12	28	16	–
Osteo-arthritis	7	40	11	7
Trapezial fibrositis	4	36	15	–
Rheumatic fever	4	25	63	–
Sacro-iliac strain	3	39	7	–
Gonococcal arthritis	3	33	18	*
Rheumatoid arthritis	3	36	38	*
Infective arthritis	3	23	29	–
Intercostal fibrositis	1	37	17	–
Osteochondritis dissecans	1	27	10	*
Spondylolisthesis	1	24	19	*
Myositis ossificans	1	37	30	1
Gout	1	26	31	*
Total	94			

* Transferred to special E.M.S. unit.

Fibrositis

This formed by far the largest group, being over 52% of the total number of rheumatic cases. The term "fibrositis" as it is usually employed means a non-articular involvement of the soft tissues, most commonly the sheaths of the muscles, the fascial layers, and other fibrous supporting tissues of the locomotor system. No direct evidence of pathology was obtained, but the changes were considered similar to those described by Stockman (1940)—that is, swelling and oedema of the affected areas with proliferation of fibroblasts and formation of new blood vessels. Later the connective-tissue cells proliferate and the area becomes more fibrous and tougher. The aetiology in nearly all the cases was thought to be traumatic, due to small muscle tears taking place during the course of training. In some cases previous industrial fibrositis had been exacerbated by training. Nearly all these men were ex-miners and were recommended for discharge on account of the strong probability of multiple recurrences. Any evidence of local sepsis was rare. In only 7 cases out of the 141, or 5%, was a focus found which might conceivably have played a part in the aetiology. Cases of fibrositis should not as a rule be admitted to hospital unless they require manipulation or intensive treatment. They should be capable of being rendered symptom-free by short periods of physiotherapy, and Army life with its regulated activities and adequate food is often good treatment for them. Lowering the man's medical category was delayed until treatment had been tried. In the majority of cases it was found to be unnecessary.

Lumbar Fibrositis (40 cases).—Fourteen of these had acute lumbago and were admitted to hospital. They were treated by strapping the back muscles longitudinally and by heat. Within a few days spinal movement was encouraged by the masseuse, and they were allowed up. At the end of a week they attended the exercise class and were given work to do in the hospital. In all cases they were returned to their units for full duty (average time 16 days). Of the men treated as out-patients the majority had minor recurrences of fibrositis which had started in civilian life. These men complained of backache intensified by exercise. On examination there was restriction of full spinal movement, with often a localized area of tenderness in the lower erector spinae muscles. Initial treatment in many cases was by local infiltration of 2% procaine. This was followed by daily heat and exercises. As soon as possible these men were put in an exercise class.

Trapezial Fibrositis (30 cases).—These men complained either of post-occipital pain and headache or of stiffness across the shoulders accentuated by wearing equipment and by drill. In 4 cases admitted for treatment the condition was of long standing and there was muscle-wasting. A localized area of tenderness could usually be palpated on the muscle sheath and the pains thus reproduced. This area was infiltrated with 2%

procaine, followed in some cases with proctocaine. Daily exercises were given afterwards.

Gluteal Fibrositis (26 cases).—It is difficult to differentiate these cases from the sciatic group as they both form part of the sciatic syndrome. They were none of them severe, and were all treated as out-patients. The complaint was of pain radiating from the buttock. On examination this could be reproduced by palpation of a localized or diffuse area, most frequently in the origin of the gluteus maximus or medius. Where localized, such an area was infiltrated with an anaesthetic. All cases were treated with heat and exercises, active and passive.

Shoulder-girdle Fibrositis (14 cases).—The symptom here was of pain radiating from the shoulder down the outer side of the arm, often to the fingers, with some pain on full movement of the joint. Deltoid wasting was present in a few. It was considered that the lesion in these cases was in the region of the subacromial bursa: either that the walls of the bursa itself had become adherent or that the bursa was stuck to the overlying deltoid or supraspinatus muscle. Joint change or calcification of the supraspinatus tendon was excluded in each case by radiography. These men were treated by local anaesthetic injected into the region of the bursa. This was followed by active exercises. In the majority one injection was sufficient.

Postural Backache; Sciatica; Osteo-arthritis

Postural Backache (40 cases).—This is a relatively common condition. During the early weeks of training the men report sick with backache. They have usually taken no exercise for some years, have been in light occupations, and are of poor physique. The types of posture have been recently described by Howitt and Wesson (1942): (1) forward slump with downtilted pelvis, lordosis, kyphosis, and the head carried forwards; (2) sway back with the weight carried on the heels, pelvis horizontal, and a long lumbo-thoracic kyphosis. Spinal movement may be restricted by pain and muscle spasm. These men were all treated by remedial exercises. Those not admitted were recommended to be sent to the Army physical development centre. In 12 cases the overlying muscle spasm was so severe that the men were unable to work and were admitted to hospital. Spinal manipulation under anaesthesia was carried out and they were given remedial exercises. As soon as possible they were transferred to a convalescent depot under the Command specialist in physical medicine. These cases are in the main capable of much improvement, and if seen at an early stage can be cured. Howitt and Wesson (1942) report that 65% can be upgraded and that 50% reach category A1. If these men remain untreated they will become chronic attenders at sick parade, and it is important that this condition should be recognized as a clinical entity occurring not uncommonly in the Army to-day.

Sciatica (24 cases, all admitted to hospital).—Cases of sciatica occurring in units should be admitted to hospital as soon as possible. They need full neurological investigation and often the opinion of an orthopaedic surgeon is called for. Even where the condition runs a short course with steady improvement, full bed rest, trained nursing, and splinting are required. Physiotherapy may be necessary in the later stages. C.S.F. examination was carried out in every case where improvement was not rapid. In 5 cases it was considered that there was an intervertebral disk lesion. They were transferred to an E.M.S. neurological unit for further examination; in 3 a disk lesion was thought unlikely, and in the other 2 manipulation was performed with relief of symptoms, though the possibility of a prolapsed disk remained. In 6 cases the sciatic syndrome was regarded as due to a severe gluteal fibrositis. After a period of rest, infiltration with local anaesthetic was carried out and followed by physiotherapy. In 3 cases sciatica of long standing had proved resistant to physiotherapy elsewhere. Manipulation was followed by restoration of full function. The remaining 10 cases made slow but steady progress. They were treated by rest, splinting, and physiotherapy. When fit they were transferred to a convalescent depot for further exercises.

Osteo-arthritis (24 cases).—The localities affected were: spine 9, hips 8, knees 3, ankle 2, shoulder 1, wrist 1. In all these there was radiological evidence of joint disorganization with osteophyte formation. The average age was 40, which may be considered low, but the younger patients had a history of either previous joint diseases—e.g., Perthes's disease—a single severe injury, or multiple microtraumata due to industrial conditions. Most of the spinal cases were in ex-miners, who were all discharged from the Service.

Other Conditions

Ankylosing Spondylitis (*Marie-Strümpell Disease*): 14 cases.—This is a large proportion for a disease which is counted a rarity. It occurs almost exclusively in young men, and therefore in the age group which was being examined; but, even so, it would appear from this small series that it may be a more common cause of backache than is generally recognized. Twelve of the cases were at an early stage with symptoms of under two years' duration—bilateral sacro-iliac changes in the radiograph, with no calcification of the spinal ligaments. They all had raised sedimentation rates, indicating activity. For example, a private aged 21 had played Rugby football the previous winter. For the past 6 months he had had increasing attacks of backache accentuated by long standing. He had been awakened at night by the pain. In the early stages massage gave relief. Examination produced the following information: height 6 ft. 5 in., back held rigid, lumbar curve flattened, all spinal movement restricted by pain, chest expansion only 1½ in., pain on flexion of right hip; otherwise a healthy man. Radiographs revealed bilateral erosion of the sacro-iliac joints. B.S.R. 30 mm. (Westergren). These men were transferred either to orthopaedic units in the E.M.S. or to spa hospitals. The two cases not admitted were of long standing. Radiographs showed a "bamboo spine," with calcification of the spinal ligaments and ankylosis of the sacro-iliac joints in each case. They were recommended for discharge from the Army.

Rheumatoid Arthritis (5 cases).—This is an uncommon disease in the Army. Three of the cases were in an active phase and were sent on to a spa for further treatment. The other two were inactive and had residual deformity of the hands and wrists; these men were retained in a lower category.

Osteochondritis Dissecans of the Spine (*Scheuermann's Disease*): 5 cases.—These men complained of backache. There was limitation of spinal movement in each case, and radiography showed typical areas of decalcification of the vertebral bodies (Schmorl's nodes). They were referred to an orthopaedic surgeon.

Rheumatic Fever (4 cases).—The average age, 25 years, of this small group is high and in each instance the attack was a primary one. All were seen at an early stage and had migratory pains, swelling and redness of the joints, with fever, tachycardia, and a high sedimentation rate. They were treated with complete bed rest until the B.S.R. returned to normal (average 63 days). When convalescent they were sent to auxiliary hospitals, being returned for check-up before going on to convalescent depots. No demonstrable cardiac complications occurred in any case.

Non-specific Infective Arthritis (4 cases).—In these men joint pain and moderate effusion were associated with a focus of infection. In 3 this was septic tonsils and in the other a dental abscess. The sedimentation rate in each case was normal. The joints subsided rapidly with rest, and the focus was removed surgically later. In one case there was a short relapse after tonsillectomy.

Gonococcal Arthritis (3 cases).—Two of these cases were early, with urethral discharge, and were transferred. The third had a history of recurrent arthritis of the ankles for over 14 years. The first attack was concurrent with gonorrhoea and there had been two reinfections since. A prostatic smear was negative. Treatment was by fever therapy, with three bouts up to 105° F. at 48-hour intervals, produced by intravenous T.A.B. The clinical result was excellent and the man was returned to duty.

Sacro-iliac Strain (3 cases).—All were traumatic in origin. The strain in each case resulted from a sudden effort to recover balance. For example, Pte. B., 5 days previously, had jumped on to a piece of wood which skidded. He made a great effort to regain his balance, and "felt something go" in the right sacro-iliac region. The pain forced him to his knees, and after walking for 10 minutes he had to go to bed. Examination

revealed pain on coughing and turning, spinal flexion limited by pain, and pelvis tilted up on the right side with scoliosis above. Lasègue's sign was present on the right side at 60 degrees, with pain in the right sacro-iliac region, and there was tenderness over the sacro-iliac joint. Radiographs disclosed no bony change. Treatment: manipulation under anaesthesia, and exercises started at once; two days later freedom from pain with full movement. All the cases were treated similarly, and each patient was returned to duty within 10 days.

Summary

All cases of rheumatism sent up to a military hospital during a year are analysed.

A brief account of their treatment and disposal is given.

The great majority of soldiers with rheumatic disease can be returned to duty as useful men.

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PSYCHOGENIC ILLNESS IN REGIMENTAL PRACTICE

BY

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This account is based on 42 cases seen during a period of twelve months. The small number does not admit of any far-reaching conclusions being drawn, but it is hoped that the observations may be of interest in providing another view of psychogenic illness in the Army. The series differs from those described by Sutherland (1941) and Hadfield (1942) in that not all the cases were admitted to hospital or seen by the psychiatrist, and consequently the investigations were not so complete as theirs.

Owing to the small numbers a broad classification has been followed and percentages are not given. The series consisted of:

Psychoneuroses	Anxiety state	19
	Hysteria	21
Psychosis		1
Psychopathic personality		1

Seven cases of anxiety state and 9 of hysteria were considered to be mild reactions. The psychotic patient had endogenous depression, and the patient of psychopathic personality showed temperamental instability of the cycloid type.

Clinical Material

The cases were seen at a medical inspection room serving a large R.A.S.C. unit, one of Royal Engineers, and a detachment of the Pioneer Corps. Thus none were front-line troops. As the units varied in size, composition, and periods of attendance during the twelve months no estimate can be made of the frequency of psychogenic cases. However, it may be mentioned that in a draft of unselected recruits direct from civilian life, consisting of 19 of the 1921 class and 3 of the 1908 class, there were 2 cases of anxiety state, 1 in each age group. In a draft of 50 men of medical category below A2 there were 1 psychosis, 1 anxiety state, and 1 hysteria. Another man, not included in this series, was a stable mental defective. Most of these had had one or more transfers between arms of the Service, and they were not a normal group, being of low medical category. Also the figures are too small to be statistically valid.

The station was a market town in the South of England. No enemy action was experienced in the area during the period under review and the rest of the country was comparatively raid-free. The R.E. unit had been on bomb-disposal work during the winter of 1940-1, but had had no casualties. In no unit was the work exceptionally arduous or highly technical. The billets were satisfactory; leave was taken regularly; and the sick rate, a good index of conditions, was always low, being frequently under 1%.

Age.—The distribution of cases according to age groups is as follows:

Age Group:	20–30	30–40	40–50	50+	Total
Anxiety state	12	5	—	2	19
Hysteria	16	4	1	—	21
Psychosis	—	—	1	—	1
Psychopathic personality	—	1	—	—	1
Total	28	10	2	2	42
Normal	81	18	1	—	100

The "normal" group are the first 100 on the nominal roll of the largest unit attending. The 2 patients over 50 years of age belonged to the Pioneer Corps.

Rank.—Among those with anxiety states were 2 corporals, 1 of whom reverted to private on account of his symptoms, and 2 lance-corporals. In the group of hysterias 1 patient had held a lance stripe for several months before losing it. Only in the one case were the responsibilities of non-commissioned rank considered to play a part in the illness. The other N.C.O. patients were reported to be satisfactory in carrying out their duties.

Previous Service.—The 2 patients over 50 had served in the war of 1914-18. Neither admitted to having then had "shell shock" or D.A.H. or other psychogenic illness. Four had had previous Army service in peacetime. One with an anxiety state was invalided in 1927 with D.A.H. He said that he recovered 6 months afterwards. The precipitating factor in this war was his being torpedoed when crossing from Eire to enlist. Of 3 patients with hysteria 1 was invalided in 1936 with what now appears to have been a hysterical pain in a hernia operation scar. Specific military conditions in the present war were a factor in 2 other cases of anxiety state. One was precipitated by bombing and the other started acutely while digging for an unexploded bomb. One man with hysteria advanced "shell shock" in the evacuation from Dunkirk as the cause of his trouble, and 1 case of anxiety state began after the patient had endured several heavy air raids in London as a first-aid worker. The average length of service was 13 months before the patients reported sick with recognized psychogenic symptoms varying from 2 days to 2 years.

Symptomatology

Only the most frequently recurring symptoms are described here.

Headache.—This was the commonest symptom. It occurred in 16 cases, 15 of which were hysteria, and was the presenting symptom in 13. It was often described as "pains in the head." The headache was aching or throbbing, stabbing or constricting, or was indescribable. The character and site varied with the individual patient, but one feature was constant: it was always related to the wearing of the steel helmet, being either induced or exacerbated by this. Three patients had a possible organic basis for the headache in previous head injury. Another had mixed astigmatism, and 4 others had defective vision corrected by spectacles. In these cases the diagnosis was based on other features in addition.

Defective Vision.—This was a prominent symptom in 6 cases, including the 4 mentioned above. The characteristic feature was that the spectacles provided by the Army, re-checked by the ophthalmologist, did not improve the condition or relieve the headache and that print became blurred after a few minutes' reading. This occurred with any subject-matter, and is akin to the inability of the patients of 1914-18 to read the war news in the newspapers. In this group 4 also had night-blindness, 2 of whom claimed to have strained their eyes with night driving. (In the same period one patient with night-blindness of organic origin was seen.)

Effort Syndrome.—This symptom-complex occurred in 7 cases of anxiety state and 1 of hysteria. In 2 patients it was induced by wearing the respirator at the alert.

Dissociation Phenomena

This term is used to describe the grosser manifestations of hysteria which occurred in 5 cases.

Case 1: Loss of Consciousness with Convulsions.—This occurred in a man who had been out for the evening with some of his comrades. It was the first occasion since his return

from leave a few days previously. He was not on good terms with his wife, whom he had married "on the rebound" when he returned from the B.E.F. to find his fiancée engaged to another man. While on leave he had had several quarrels with her because he preferred the company of his male friends to hers. The connexion was pointed out to him, and no further manifestations were seen.

Case 2.—The symptoms were similar to those of Case 1. The patient had reported sick once or twice with headache suspected to be of hysterical nature. He said he had had "shell shock" but had not been under medical care for it owing to the confusion at Dunkirk. He was not aware that arrangements had been made for his further examination in hospital, so presumably this condition occurred in order to impress the medical officer with the gravity of his symptoms. He returned to duty later.

Case 3.—After 3 years' service in peacetime this man was invalided with a painful operation scar in which he was convinced a nerve was caught up. When called up for service with his Army class he was examined by a surgeon, who concluded that the pain was hysterical. He complained of headache that felt as if there was a tight band round the head, defective vision uncorrected by spectacles, and night-blindness caused by the strain of driving at night. He was nervous in air raids. Two relatives had been killed in London, and his child had recently died. He had been deprived of a lance stripe for disciplinary offences. The psychiatrist reported: "This man is of very poor moral type and is a constitutional hysteric. His general intelligence is well below average, his mental age being 11 years. He is a person unfitted for the ordinary duties of a combatant soldier, and under active service conditions in such a unit (R.A.S.C.) could only be a continual source of liability." He was recommended for transfer to the Pioneer Corps. Before the transfer became effective he was admitted to the camp reception station for a minor ailment. There he showed erratic behaviour of a hysterical nature, including pseudo-epileptic attacks. He was admitted to a neurosis centre and then invalided from the Service.

Case 4.—A recruit aged 19 complained of symptoms on exertion typical of the effort syndrome. No psychopathic family history was elicited. Since he had had rheumatic fever 3 years before being called up he had been careful not to exert himself; he had a light job and played no games. There were no clinical signs of a cardiac lesion. Explanation, encouragement, and light exercise produced no improvement, and his admission to an effort syndrome clinic was arranged. The day before he was due to go it was found impossible to wake him at réveillé. He was left alone and came round after 3 or 4 hours. This was thought to be a sign that he did not wish to lose his symptoms, for which he was excused from doing drill, route marches, and guard duty. It transpired, however, that all arrangements had been made for his wedding 3 days hence. He had made no attempt to get leave for it (he knew he was unlikely to get leave, as his admission to hospital had been arranged), and had not tried to postpone the wedding. Thus he endeavoured to shut out the world and his difficulties.

Case 5.—This man of 42 presented the "syndrome of approximate answers." He was seen when charged with absence without leave. His documents showed five similar offences previously. He was very vague in manner, and said he was worried and depressed and wanted to see his wife and children. A medical report revealed a complaint of impotence some months previously. This had not improved, he said. His intelligence seemed below normal, and his commanding officer had gained the impression that he was trying to appear less intelligent than he really was. He had served 7 years in the Regular Army in the early twenties. The psychiatrist reported: "The first impression is one of malingering, and undoubtedly there is considerable conscious exaggeration of the complaint; e.g., he first denied being able to read, but read quite well when encouraged. He exhibits the syndrome of approximate answers: pen–pencil; ink bottle–glass; pin–needle; figures–all one or two numerals out; brown–green; dark blue–pink; red–white. There is mental depression in a person of below average intelligence with a hysterical state. The phenomena are on the borderline between conscious and unconscious." He was admitted to a neurosis centre.

Case-taking

Any soldier appearing on sick parade with a complaint suggestive of psychogenic illness was told to remain until the others had been dealt with. He was then seen alone, and there was ample time to hear his story. The first interview usually lasted half an hour. A full history of the complaint was taken and questions were directed to a brief personal history from childhood, school work, civilian occupation, hobbies, attitude towards service, and family history.

Intelligence was not formally tested, but a rough assessment was made from memory and comprehension of details in the history, school-leaving age, and class attained, and the type and frequency of change of employment. It was found useful to ask the weekly wage, and then, "How much is that per year?" Officers and N.C.O.s could provide evidence of the patient's general attitude and response to training. Fourteen men with hysteria, 1 with an anxiety state, were considered to be mentally backward. This was confirmed by the psychiatrist in 8 cases.

The patient was examined as fully as facilities allowed, and was referred to the appropriate specialist for an opinion on any physical disability claimed. It was found in 15 cases that a sympathetic hearing and a full examination, and reassurance and perhaps a change of conditions and mild sedation, sufficed to keep the patient at duty. The psychotherapy was not carried out in more than three or four interviews, and was on the lines described by Ross (1937). If this failed or was obviously likely to be insufficient the patient was sent to the area psychiatrist for advice as to disposal.

Disposal

Twenty-two patients remained at duty. Of these, 2 with chronic anxiety states were placed in Category C (home service only) and were posted to other units, as were 5 others; the 15 remaining under observation—8 who had an anxiety state and 7 who had hysteria—have not made further complaint. Five soldiers were invalided from the Service while with their units. They were a man of 52 with an acute anxiety state, 3 chronic hysterics, and the patient of unstable temperament. One man with a chronic anxiety state and 2 men with hysteria based on mental defect were transferred to the Pioneer Corps. Of 9 patients admitted to E.M.S. neurosis centres, 1 with effort syndrome returned to his unit improved, and it is known that 1 patient with hysteria and 2 with anxiety state were invalided. One of 2 patients originally admitted to non-psychiatric hospitals returned to duty. The fate of the other 6 patients is not known, as no reply was obtained to requests for information. The results are tabled below.

Condition	Disposal	Cases
Anxiety state ..	At duty	8
	Transferred to P.C.	1
	Invalided	3
	Unknown	7
Hysteria	At duty	9
	Transferred to P.C.	2
	Invalided	3
	Unknown	7
Psychosis	To military mental hospital	1
Psychopathic personality ..	Invalided	1

Discussion

The "anxiety" of the anxiety state is derived from the German *Angst*, which is usually rendered as "morbid fear." In the cases of anxiety state this was the chief feature, and the symptoms could be regarded as the physical concomitants of fear, in whole or in part, misinterpreted or unrecognized by the patient. In hysteria the clinical features are: (1) a physical manifestation without structural lesion; (2) a calm mental attitude—the *belle indifférence* of Janet; (3) episodic mental states indicative of dissociation (Henderson and Gillespie, 1936). In the cases seen the physical manifestation was the presenting complaint, and the degree of dissociation varied from simple non-recognition of the cause to complete dissociation as shown by the hysterical fit and loss of consciousness. It could not be said, however, that *belle indifférence* was a feature. The patients showed true anxiety, an emotion compounded of desire and fear, which caused them to report sick. There was always the desire, more or less unconscious, to escape from military service or an unpleasant duty, such as guard duty. The steel helmet, worn on guard or in active operations, caused abnormally severe headache; spectacles failed to correct defective vision; night-blindness was discovered; epigastric pain and vomiting persisted in spite of negative physical findings and repeated reassurance. These disabilities offered them an honourable escape from military

service, but, unlike the patients of 1914-18 with such obvious physical signs as paralysis or contracture, they could not be calm and confident. There was fear, also unconscious, that they would not attain their desire.

Hysteria was the reaction of the man of subnormal intelligence when conditions became too unpleasant or difficult to cope with. In several the reaction was only episodic, and if they could be helped through the crisis by a change of conditions, or advice on their worries, or encouragement, they would settle down again. It is debatable whether this is a sound policy, as there is no sure means of gauging if the soldier will remain stable in the stress of battle. The medical officer must weigh the patient's present against his potential value as a soldier, and must also consider the effect on morale. Few can watch an unemotional hysteric return to civilian life without questioning the genuineness of his disability, whereas the man with an acute anxiety state is obviously ill. Transfer to the Pioneer Corps and recategorization to C are a partial solution, but there are still some men who, though physically sound, are psychologically unfit for military service.

Capt. G. R. Peberdy, R.A.M.C., deserves my thanks for much help and encouragement in dealing with these patients and for permission to quote from his reports in Cases 3 and 5.

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Medical Memoranda

Exfoliative Dermatitis in the Newborn

As exfoliative dermatitis in newborn children (Ritter's disease) is generally mentioned in textbooks as a fatal disease, the following cases, which responded to treatment with proseptasine in large doses and 1% aqueous gentian violet, are worth recording.

CASE REPORTS

Case 1.—I was called in by the district nurse to see a male baby 10 days old. She told me that at 7 days it had developed jaundice and that on the morning of the tenth day "it was a curious colour and its skin was coming off." On examination I found a well-developed baby, but with a curious bright pink colour reminiscent of CO_2 poisoning. The epidermis was so loosely adherent to the underlying tissue that in handling it this was removed, leaving exposed a red raw corium, most marked on the back and buttocks. There were no bullae—a feature in pemphigus neonatorum. Knowing that this was generally a form of impetigo and was apt to develop into a staphylococcal septicaemia, and being aware that babies stand the sulphonamides well, I gave 1.5 g. of proseptasine in milk at once and ordered 0.5 g. to be given 4-hourly, and had the body dabbed with 1% aqueous solution of gentian violet wherever the skin was broken. The temperature was normal, as is usual, and fortunately the baby was breast-fed and sucked well. The next day the condition was subsiding, though fresh places were breaking out and the lips and the mucous membrane of the mouth were infected. The child had not been sick, took its food well, and was comfortable—in contrast with the previous evening, when it had screamed most of the time. I continued the proseptasine for 5 days, reducing the dose from 0.5 g. every 4 hours to three times a day after the second day, and allowed a bath with a weak solution of potassium permanganate on the fourth day of infection. After 3 weeks the child was putting on weight, the skin was returning to normal, and I could foresee no further trouble.

Case 2.—This child was attended by the same district nurse and was 13 days old. I saw it the day after I had seen Case 1. The condition was not so pronounced, the skin coming off mostly on the flexors and face. The eyelids were affected and the eyes were gummed up. I gave similar treatment, and also anointed round the eyes with yellow oxide of mercury. This child had also nearly returned to normal 3 weeks later.

The second patient was perhaps infected by the nurse before the extreme infectiousness of the condition was realized, and the infection lessened in transit. Both cases recovered after large doses of proseptasine and a 1% solution of gentian violet.

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Reviews

THE MEDICAL ANNUAL

The Medical Annual, 1942. A Year Book of Treatment and Practitioner's Index. Sixtieth Year. Editors: H. Letheby Tidy, M.D., F.R.C.P., and A. Rendle Short, M.D., F.R.C.S. (Pp. 396; illustrated. 25s.) Bristol: John Wright and Sons; London: Simpkin Marshall, Ltd.

Once more in the familiar green cover the *Medical Annual* makes its yearly appearance, suffering, as so many of us have done during this war, from a slight loss of weight due to rationing. Nevertheless all the familiar features are preserved. The customary "Introduction by the Editors" puts into focus the medical events of the past year, and at the same time gives the reader valuable guidance to the detailed contents, which are arranged, as usual, alphabetically. Subjects which have come to the fore during the war, such as mass radiography and dyspepsia in the Forces, the application of psychology to the selection of personnel, the treatment of burns, and blood transfusion, are all naturally given prominent place. An article on shelter health by Lord Horder reminds us of the turmoil of about two years ago, and the Editors take the opportunity to commend the part played by the Horder Committee in the solution of shelter difficulties. We note one small point, and that is the editorial use of the word "oestrin" as if it were an accepted physiological term, whereas it is in fact a proprietary term.

It is, as the publishers remark, now no secret that their works at Bristol, together with valuable plant and a large quantity of stock, were destroyed by enemy action, and the present volume has been produced at Weston-super-Mare. The medical profession will wish them well in the valuable part they continue to play in medical publishing.

NON-PULMONARY TUBERCULOSIS

Non-pulmonary Tuberculosis. By Michael C. Wilkinson, M.B., B.S. (Pp. 174; 12 figures. 12s. 6d.) London: Hamish Hamilton Medical Books. 1942.

This book embodies the experience gained by the author in the observation and treatment of cases of non-pulmonary tuberculosis in a sanatorium over a period of seven years, and a follow-up survey of 593 cases treated in this institution. The whole field of non-pulmonary tuberculosis is covered, including glandular, abdominal, genito-urinary, and parietal thoracic tuberculosis, as well as tuberculosis of bone and joints. Treatment of the last-mentioned conditions is therefore not dealt with in anything like so much detail as it is, for example, in Mr. Girdlestone's book on tuberculosis of bone and joints, published in 1938, the author concerning himself with general principles of treatment and the indication for and timing of operative intervention rather than with details of operative technique, which are, however, not entirely omitted. Stress is rightly laid on the paramount importance of prolonged and adequate constitutional treatment before surgical intervention is undertaken. The latter is necessary in most cases, but should be considered only as an adjuvant measure to be used at the right time in each individual case.

The author regards the lymphatic glands as a defence mechanism, and notes that children who develop tuberculous adenitis do not, as a rule, subsequently get haematogenous infections, though he admits that the defence may break down in debilitated patients or those exposed to massive infection. This is somewhat at variance with Mr. Girdlestone's contention that heavily infected tuberculous glands cease to be protective and become themselves a source of bacillaemic showers and haematogenous infections. Tables of end-results are given for each class of case and these are interesting and valuable, but their value would be greater if brief details were given of the clinical, *x*-ray, or laboratory findings on which the diagnosis was made rather than a general statement that it was made on good evidence, especially in cases where good movement of a tuberculous joint is claimed. Diagnosis by excision of a regional gland is mentioned in the case of the knee, but not of the hip-joint, though excision of iliac glands has already given a number of positive results in the latter cases.

The book, though it contains nothing actually new, is of undoubted value as a first-hand record of practical experience

and shrewd observation in this field, and, as such, can be read with advantage by all those concerned with the treatment of tuberculosis from whatever point of view they may approach the problem.

CONTEMPORARY PHYSIOLOGY

Annual Review of Physiology. James Murray Luck, Editor; Victor E. Hall, Associate Editor. Vol. 4. (Published by the American Physiological Society and Annual Reviews, Inc.) (Pp. 709. $5.00.) Stanford University, California: Annual Reviews Inc. 1942.

This volume contains references to nearly four thousand original papers, and to about the same number of authors' names: the task of selecting these from the enormous bulk of contemporary literature must have been enormous, though, of course, there is great variability in the available numbers of papers relating to the different reviews. The largest number no doubt are those that refer to the physiology of reproduction, and this review lists 486 references; in a relatively restricted field such as in the review on the physiological effects of neutron rays only 31 references are given. It is probable that reviews covering more restricted fields, such as the latter one, are able to quote a larger fraction of the published work than are the ones dealing with richer bibliographical resources. Further, the treatment in such reviews has the opportunity to cover its ground in a more leisurely and thorough manner, and so to be more generally instructive than that of the overcrowded branches of the subject.

It would be difficult to pick out any of the reviews for detailed comment, since each is itself a condensation of so much. The following is a list of the reviews. Permeability, by L. R. Blinks; the physiological effects of neutron rays, by P. C. Aebersold and J. H. Lawrence; physiological aspects of genetics, by H. H. Strandskov; developmental physiology, by H. L. Hamilton and B. H. Willier; water metabolism, by J. P. Peters; growth, by G. S. Avery; energy metabolism, by W. H. Chambers, E. Shorr, and S. B. Barker; the physiology of the skin, by P. C. Baird, jun., W. F. Lever, and T. D. Spies; the peripheral circulation, by A. B. Hertzman; the heart, by M. B. Visscher; the blood, by H. P. Smith; the digestive system, by E. J. Van Liere; the kidney, by J. A. Shannon; electrophysiology, by R. W. Gerard; the spinal cord and reflex action, by T. C. Ruch; the central nervous system, by M. Hines; the autonomic nervous system, by K. Hare and J. C. Hinsey; sense organs, by H. K. Hartline; metabolic functions of the endocrine glands, by C. N. H. Long; the physiology of reproduction, by F. L. Hisaw and E. B. Astwood; physiological psychology, by C. P. Richter; applied physiology, by A. R. Behnke and C. S. Stephenson; and the pharmacology of drug addiction, by M. I. Smith.

TREATMENT OF VENEREAL DISEASE

The Modern Treatment of Venereal Diseases. By E. T. Burke, D.S.O., M.B., Ch.B. (Pp. 105. 12s. 6d.) London: John Bale Medical Publications, Ltd. 1942.

Burke's *Modern Treatment of Venereal Diseases* contains essentially the same subject-matter as the treatment section of his larger book, *Venereal Diseases*, published in 1940. Most syphilologists will remember that Burke was a strong advocate of the alternating-continuous method of treating syphilis and of the use of oil-soluble bismuth to the almost complete exclusion of all other preparations of this metal, and that his plan of treatment is worked out according to his "efficiency index." A discussion of this last is not possible within the scope of a short review, but while the theory is ingenious in conception it has not been adopted by any considerable number of syphilologists. Mercury is recommended only in the form of collosol mercury sulphide, and "mercury pills, mixtures, and inunctions constitute, at the present day, a reprehensible trifling with the future well-being of the patient"; on the other hand, great faith is placed in iodine, especially in late syphilis. The account given of the reactions produced by antisyphilitic agents is good, but more might have been said with advantage about post-arsphenamine jaundice and its treatment.

Nearly three-quarters of this little book are devoted to syphilis, only some 28 pages being allotted to gonorrhoea, chancroid, and other forms of venereal disease. The optimum dosage of sulphonamides in gonorrhoea is not yet settled, but few will agree with a comparatively low one extending over 14 days; a fuller account of the toxic effects of these drugs and their treatment would have added much to the value of this book, as would a section on non-gonococcal urethritis, which appears to be very much on the increase. Many people regarded Burke as a crank, but he was a crank of very wide experience, and a study of this his last publication is recommended to all venereologists, who will be able to sift the grain from the chaff; repeated references in this book to the large volume are not very helpful, since the possessor of the latter will hardly need to read the former. The price appears to be disproportionate to the size, even in these wartime days.

Notes on Books

The fourth edition of Prof. F. J. BROWNE'S now famous textbook, *Antenatal and Postnatal Care*, is no "austerity" volume. It has been completely revised and drastic pruning has improved the final product. Pages have been saved by transferring the bibliography to the end of each chapter, and although much new material has been added the edition is a little smaller than its predecessor. As the field it covers becomes ever wider this book will soon be outgrowing its title, indeed there is some evidence to suggest that it has done so already; but whatever its name should be the seven-year-old will be welcomed and generally acclaimed as the best edition yet printed. It is published by J. and A. Churchill at 24s.

The first edition of HOLMES and RUGGLES'S *Roentgen Interpretation* was published in 1919, and it is an index of the popularity of this excellent little handbook that it has now reached its sixth edition (Henry Kimpton; 24s.). The standard has been well maintained in this, and there are few criticisms to offer. Some of the illustrations, in the section on the urinary tract particularly, might with advantage be replaced by more modern ones. Many radiologists will regret to see that the authors recommend the practice of setting fractures and removing foreign bodies under the fluorescent screen. The book makes no pretence of being a complete account of diagnostic radiology, but aims rather to give a condensed survey for students seeking an outline of the subject. In this the authors succeed very well, and the volume is to be recommended for this purpose.

Preparations and Appliances

GONADOTROPHIC HORMONE FROM PREGNANT MARES' SERUM

Messrs. Boots manufacture a gonadotrophic hormone from the serum of pregnant mares called "antostab," which is supplied as a dry powder together with a solvent of saline and 0.3% tricresol. It is standardized in international units, 1 I.U. being the activity of 0.25 mg. of the hormone; usually a course of six injections of 200 I.U. given intramuscularly twice a week is suitable for most cases, though the dose must be adjusted individually. It is recommended for trial in cases of amenorrhoea, sterility of ovarian origin, and selected types of irregular bleeding, but should never be used until a thorough examination has excluded general and pelvic disease. While there is as yet insufficient clinical evidence to evaluate the hormonal treatment of disturbances of menstruation, there is no doubt that the gonadotrophic hormone from the serum of pregnant mares should theoretically be of considerable value, and on the basis of animal experiments it is more potent than the hormone of pregnancy urine.

VITAMIN K ANALOGUES

Menaphthone-Boots and acetomenaphthone-Boots are synthetic vitamin K analogues which have the same physiological properties and are more potent than natural vitamin K. Menaphthone is the approved name for 2-methyl-1 : 4-naphthaquinone and acetomenaphthone is 1 : 4-diacetoxy-2-methylnaphthalene. Menaphthone and acetomenaphthone are indicated in the treatment of neonatal haemorrhage and in conditions where digestion of fats is disturbed or inhibited or absorption deranged—e.g., obstructive jaundice, biliary fistula, idiopathic steatorrhoea, and coeliac disease. Menaphthone is supplied in ampoules as an oily solution for intramuscular injection, and acetomenaphthone in tablets for oral administration. Literature and samples will be sent on request to the Medical Department, Boots Pure Drug Co., Ltd., Station Street, Nottingham.

BRITISH MEDICAL JOURNAL

LONDON

SATURDAY SEPTEMBER 19 1942

THE ANATOMY OF CUTANEOUS SENSIBILITY

The increase of peripheral nerve injuries related to war conditions, and, more particularly, their segregation in special centres for treatment, have again focused attention on the anatomy of cutaneous sensibility. Von Frey is often credited with having established the relation between specific nerve-endings and specific modalities of sensation. Dallenbach[1] has pointed out, however, that in reality von Frey was more cautious in his statements. Recently, Gilmer and Haythorn[2] have attempted to identify skin-pressure vibration spots with nerve-endings beneath them. Using a variety of staining methods and thin serial sections of biopsy material they were unable to find endings of one particular type beneath the spots. They stated, however, that all the staining methods employed were unsatisfactory in that no single stain demonstrated all the nerve elements they wished to study, and it was thus necessary to treat a number of the sections by different methods. They tentatively concluded that richly innervated arteriovenous anastomoses might be in some way related to the sensory interpretations, for in several biopsy specimens such bodies were present just beneath the sensitive spots. Woollard *et al.*,[3] on the other hand, brought forward very good evidence that specific endings at different depths beneath the skin subserve specific modalities of sensation, and they also showed that cutaneous pain is subserved by a morphologically specific type of nerve termination. Weddell,[4] proceeding on the lines indicated by Woollard, has insisted on the need for examining large whole preparations of skin, including the underlying tissues, to get a true picture of the relation of a sensory "spot" to its subjacent nerves and endings. For this purpose he uses vital staining with methylene blue to demonstrate both the nerve fibres and their endings. By such methods it has been shown that sensory "spots" in the skin overlie more than one individual nerve-ending (or group of endings) of the same type, and that the nerve fibres subserving the endings (or groups of endings) are not a series of collaterals derived from one nerve fibre, but (as far as they can be traced) are separate fibres which approach the "spot" from different directions. For example, it was found in one case that situated beneath a cold "spot" were two groups of Krause's end-bulbs lying at a depth of 1 mm. beneath the skin surface and separated from each other by 3 mm. It has also been demonstrated (Weddell[5]) that in a human finger pad, an area of acute tactile sensibility, large Meissner's corpuscles are situated in groups of two or three, each ending connected with a single unbranched nerve fibre. In addition, it has been shown that, while in the finger pad certain nerve fibres are surmounted by single Meissner's corpuscles, in the forearm a single nerve fibre may give rise to a number of separate Krause's end-bulbs; and, furthermore, cutaneous pain is shown to be subserved by terminal networks which spread over still larger areas. For example, a single nerve fibre in the dorsum of the hand has been found to give rise to a terminal network of fine beaded fibres covering an approximately circular area of maximum diameter 0.75 cm. In confirmation of such histological findings, Tower[6] has been able to show by electrophysiological methods that the terminal ramifications of a single afferent fibre from the rabbit's cornea comprise a unit area of from 50 to 200 sq. mm., the area having sharply defined limits. She has suggested the term "sensory unit" for such terminations, on the analogy of the "motor unit."

Thus, it becomes clear that a sensory "spot" is not synonymous with a single nerve-ending at the end of a single nerve fibre. "Spots" overlie groups of specific endings which lie at some depth from the surface and are borne upon separate nerve fibres. It also appears that a "spot" need not immediately overlie one particular ending or group of endings, but is so situated that the application of the stimulus affects the maximum number of subjacent specific terminals. The failure of Gilmer and Haythorn to find specific nerve-endings beneath skin-pressure vibration spots is thus hardly surprising, but, as explained above, their failure is not an argument in favour of the non-specificity of cutaneous nerve terminals.

It has been suspected for some time that the innervation of sensory "spots" is not simple; in fact Head[7] found it necessary to postulate two collateral systems of nerve fibres (protopathic and epicritic) to account for his observations on the return of cutaneous sensibility after division of a cutaneous nerve. Boring,[8] on the other hand, was led to infer a multiple innervation of sensory "spots" by fibres of one type to explain his own observations after division of a cutaneous nerve. In a recent critical review on the anatomy and physiology of cutaneous sensibility Walshe[9] has shown that the histological findings of Woollard and Weddell form a concordant anatomical basis for the careful clinical observations of Trotter and Davies,[10 11] who repeated and elaborated the work of Head from a quantitative rather than a qualitative point of view. As Walshe points out, the work of Trotter and Davies has not received the attention and credit which are due to it from neurologists. To quote a passage from his review: "In view of the richly suggestive character of Trotter's writings upon cutaneous sensibility it is striking how little influence they have exerted, and the cynic might submit that this is because he coined no new words to adorn his exposition. The sway exercised upon the imagination of neurologists and physiologists by the words 'epicritic' and 'protopathic' may have had not a little to do with the continued currency of the hypothesis which was their setting."

THE DEMAND ON THE BLOOD DONOR

The general acceptance of blood transfusion as a practicable form of treatment can be dated at 1922, when there were 13 calls on the British Red Cross Society Blood Transfusion Service. In 1930 the number had risen to 1,627. The service was still confined to London, and, though the curve continued to rise, the rate of acceleration slowed down for the next five years.[12] At that time a transfusion was synonymous with the administration of a pint of fresh blood, but the work of Marriott and Kekwick[13] on massive drip transfusion in 1935 led to a considerable increase in the size of individual transfusions and in the indications for the operation. Further increases have come with developments in the use of stored blood, serum,

1 *Amer. J. Psychol.*, 1927, **39**, 402.
2 *Arch. Neurol. Psychiat.*, Chicago, 1941, **46**, 621.
3 *J. Anat.*, Lond., 1940, **74**, 413.
4 Ibid., 1941, **75**, 346.
5 Ibid., 441.
6 *J. Neurophysiol.*, 1940, **3**, 486.
7 *Studies in Neurology*, 2 vols., London, 1930.
8 *Quart. J. exp. Physiol.*, 1916, **10**, 1.
9 *Brain*, 1942, **65**, 48.
10 *J. Physiol.*, 1909, **38**, 134.
11 *J. Psychol. u. Neurol.*, 1913, **20**, Ergnzngshft., 102.
12 *Times*, April 27, 1931.
13 *Lancet*, 1935, **1**, 977.

plasma, and concentrated red cells, and the provision of blood banks and depots for the emergencies of war. It needs to be emphasized in looking to the future that while the war has accelerated the provision of facilities the increase in blood transfusions is not due to war needs but to technical advances in blood storage, and that an even sharper rise occurred in America at a time when there was no thought of preparation for hostilities.[14] A modern general hospital in this country can already be expected to be using at least 1,000 pints of blood and plasma a year on purely civilian needs—in particular, medical ailments, diseases of women, and accidents of childbirth—and our planners who think in terms of a 1,000-bed hospital for a town with a population of 100,000 must remember to include in their health centre a blood transfusion service capable of collecting not less than 3,000 pints of blood per annum.

As early as 1931[15] it had been learnt that individuals might donate a very large amount of blood over a short period of time with surprisingly little effect on the blood count, though it was felt that the ideal amount was 400 c.cm. for males and 300 c.cm. for females, and the interval not less than three months. By the summer of 1934 the silver bar which is awarded for giving 50 transfusions had been conferred twice by the British Red Cross Society[16]; and in 1936 a Paris letter[17] mentioned a donor who had given a total of 257 litres of blood, including 98 transfusions of approximately 300 c.cm. each in the year 1935. This implies the regeneration of about 2% of haemoglobin a day and the assimilation of 300 mg. of iron a week, which would not be within the compass of the marrow unless extra iron was supplied. Exceptional feats must not blind us to the fact that repeated bloodletting is a stringent test of the efficiency of the haemopoietic system and the adequacy, or rather supereminence, of the diet. A strong note of caution was sounded by Snapper and co-workers in 1939.[18] In a study of 101 professional donors in China they found 76 with subnormal blood counts. The frequency and extent of anaemia increased with the total amount of blood withdrawn or the duration of service. Poor diet was considered to be an important factor in the sluggish haemopoietic activity. Treatment with large doses of iron resulted in prompt improvement in the anaemia in most of the cases, while cessation of blood donation alone was uncertain and less effective.

These observations indicate the need for careful supervision of British donors after three years of wartime restrictions on diet, the enlistment by the fighting Services of many of the robust young adult males, and the greater use of females and less fit age groups. Surveys, published[19] and unpublished, show that at the present time many women in the reproductive age group are anaemic, and suggest, though with less assurance, that the incidence of anaemia is increasing. Transfusion officers are beginning to realize the need for checking the haemoglobin level before bleeding and for prescribing iron for the prevention and treatment of anaemia in blood donors. A good deal of work remains to be done in determining the optimum dosage of iron and the necessary duration of treatment. Santy[20] worked with a small group of professional male donors who gave blood at an average rate of 132 c.cm. a week over a period of 12 weeks. The number of donations per donor averaged 4. Using exsiccated ferrous sulphate in a dosage equivalent to 250 mg. $Fe^{\cdot\cdot}$ a day, he found that the haemoglobin was regenerated eight times as quickly when the donors were receiving iron, and that the recovery period was shortened to ten days. He suggested that professional male donors receiving iron could be expected to give 500 c.cm. of blood at fortnightly intervals without lowering the haemoglobin level. His results cannot be transferred directly to the non-professional female donor, but they confirm the efficacy of iron. Fowler and Barer[21] found that a donation of 300 c.cm. of blood reduced the haemoglobin on the average by 10%, and 550 c.cm. reduced it by 18%. Without iron, regeneration took 50 days, but with iron and ammonium citrate equivalent to 200 mg. $Fe^{\cdot\cdot\cdot}$ a day it was reduced to 35 days. The administration of iron had progressively less effect after successive bleedings. The scale preparation of iron seems therefore to have been a good deal less effective than the ferrous salt.

From this and other evidence we may conclude that, provided the diet is supplemented with adequate amounts of medicinal iron, men and women can give blood with safety, and without deterioration of haemoglobin levels, far more often than is ever likely to be asked of them as voluntary transfusion donors. Nevertheless the range of human variation in erythropoiesis is likely to be wide, and supervision should be careful. It seems unwise to bleed a donor whose haemoglobin is below 11.7 g. per 100 c.cm., or 85% on the Haldane scale. Such volunteers should be advised to take iron and be seen again after an interval. For administrative reasons it may be simpler to prescribe iron for all donors after bleeding. Treatment will probably be most successful and acceptable if it is relatively intensive and of short duration; but this is a matter for further study.

THE PERSONAL FACTOR IN ACCIDENTS

The Medical Research Council has recently reconstituted the Industrial Health Research Board on a wider basis, which includes, to a greater extent than before, the prevention and relief of sickness resulting from the particular health hazards to which industrial workers are exposed. Among these hazards accidents loom large, and there has been a considerable increase of them during the war, chiefly owing to the employment of greater numbers of people, many of them inexperienced. In Emergency Report No. 3 the personal factor in accident causation is discussed.[22] The report is based largely on studies made by investigators on the staff of the Health Board, and it is suggested that these studies ought to prove an effective ancillary to the preventive and protective regulations of the Ministry of Labour and to the propaganda of the Royal Society for the Prevention of Accidents. The first part of the report briefly summarizes the influence of environmental factors, such as hours of work, heating and ventilation, lighting, age and experience, on accident liability, while the second and main part is almost entirely concerned with the subject of accident-proneness. It is pointed out that the gravity of an accident depends largely on chance circumstances, and as it has been found that accident-proneness is a relatively stable factor, it follows that persons who are found to be liable to incur minor accidents more frequently than the average are likewise more liable to incur major accidents. In order to identify these accident-prone persons, various psychological tests have been applied to large groups of comparable subjects, working under similar conditions, and it has been found that tests

[14] Parkhurst, L. W., and Bauer, J. T. (1941). *Bull. Ayer clin. Lab.*, **3**, 413.
[15] Jones, H. W., Widing, H., and Nelson, L. (1931). *J. Amer. med. Ass.*, **96**, 1297.
[16] *Times*, Aug. 30, 1934.
[17] *J. Amer. med. Ass.*, 1936, **106**, 1507.
[18] *Chin. med. J.*, 1939, **56**, 403.
[19] Mackay, H. M., *et al.* (1942). *Lancet*, **2**, 32.
[20] *Amer. J. med. Sci.*, 1941, **201**, 790.
[21] *J. Amer. med. Ass.*, 1942, **118**, 421.
[22] *The Personal Factor in Accidents.* Industrial Health Research Board. Emergency Report, No. 3. H.M. Stationery Office. (4d.)

involving rapid and accurate hand and eye co-ordination serve to differentiate them in some degree. Thus the worst 25% of the groups tested had, on an average, twice as great an accident rate as that of the best 25%. In assigning fresh workers to relatively dangerous occupations, such as those requiring the use of presses, it would therefore be distinctly advantageous to choose them from those who did best at the tests rather than from the general average. The results so far obtained show that the tests are valid for prediction among skilled workers only.

In most factories psychological tests are seldom used as a routine method, so the accident-prone have to be identified on the basis of their previous accident records. This method does not detect the accident-prone so well as the psychological tests, and if the workers happen to have been assigned to rather dangerous occupations their susceptibility may prove disastrous to them before its existence has been realized. It is therefore desirable that workers who are to be put on somewhat dangerous machines should be chosen only from those who have previously been tested psychologically, or who have shown, by their record in other and comparatively safe occupations, that they are not to be classed with the accident-prone. Best of all would it be to employ workers who have demonstrated their quality by both the methods mentioned. In some occupations, such as the driving of motor vehicles, it may be difficult or impossible to apply the double test from the start, but if a group of would-be drivers are first selected by means of the psychological tests, and then are selected afterwards on the basis of their accident records, there can be no doubt that the successful survivors of the tests will have a lower accident rate than unselected groups. It is not to be imagined that accident-prone persons are to be deprived of all employment, for there are many occupations in which accidents are infrequent and in which those that do occur are trivial. It is only from the more dangerous occupations that they ought to be warned off.

If proper use is to be made of our knowledge of accident causation, it is most important that adequate accident records be kept. In many factories the records give merely the total number of accidents attended to, or only those of sufficient gravity to earn compensation. Each worker, whether he has sustained an accident or not, should therefore have a card made out for him when he is first employed, on which should be recorded all accidents, trivial and serious. Records of minor ailments treated at the ambulance room may with advantage be kept on the back of the same card.

THE EPIGLOTTIS IN ANAESTHETIC DEATHS

Healthy scepticism regarding alleged new observations in medicine is always advisable, but if carried too far it may lead to the neglect of important new facts. In an article in the current issue of the *Journal of Laryngology* (May, 1942) Mr. G. H. Caiger suggests that this has happened in regard to impaction of the epiglottis during anaesthesia. It is interesting to review the course of events. Careful comparison of the independent clinical observations published by four separate observers shows agreement on all chief points; when pieced together they present an interesting and instructive sequence. About 1908 Col. F. J. Palmer of the I.M.S. observed that the epiglottis was capable of causing respiratory obstruction under anaesthesia. Later experience confirmed this observation. More than one patient apparently moribund was resuscitated by a finger in the pharynx restoring the epiglottis to its normal position. As years went by and case after case repeated similar experience, Col. Palmer became convinced of the value of his discovery. His colleagues, however, remained sceptical. The anaesthetist concerned in one such case of dramatic recovery declined to believe that the manipulation of the epiglottis into position, so freeing the airway, had been the cause of it, but suggested that there had been a rallying of the heart, or some other such cause, to explain the revival. Met with such scepticism, Palmer did not publish his observations for some fifteen years. Then in this *Journal* on Aug. 25, 1923, H. Mortimer Wharry described in a letter a case in which a membranous epiglottis had caused serious respiratory trouble during a tonsil operation; displaced backwards over the larynx, and adherent to the pharyngeal wall by sticky mucus, it was acting as a valve, permitting air to escape from the windpipe but preventing its entry. When the epiglottis was replaced by the finger, the airway being thus restored, breathing began again and the operation could be completed. Arguing from this experience Wharry recommended that in every case in which unexplained dyspnoea occurred under anaesthesia the larynx should be examined digitally. Apparently encouraged by Wharry's letter, Palmer on Dec. 1, 1923, recorded his observations before a Division meeting of the B.M.A. in Assam, and on Feb. 23, 1924, described them in a letter in these columns. G. H. Caiger, then house-surgeon at Bart's, read this letter with special interest, having lately had an apparently unexplained death of a patient under anaesthesia during operation for hernia. Shortly after, at a tonsil operation where he was present, the respiration failed and he was allowed to make a digital examination of the larynx, found the epiglottis impacted in the larynx, and was able to release it "with an audible click." Respiration became normal and the operation was completed. On May 21, 1927, H. M. Wharry, in a three-page article in the *Journal*, said that since 1923 he had seen "three cases of complete obstruction . . . and many cases of partial obstruction due to this cause"—impaction of the epiglottis. He refers to its "pernicious valve-like action," and points out that in these cases artificial respiration is of no avail until the epiglottis has been raised by the finger and pressed against the back of the tongue, where it should be held till danger is past. Following on this article by Wharry, G. H. Caiger (*Journal*, Aug. 6, 1927) recorded that during 3 years he had seen no fewer than 8 cases of epiglottic impaction. The suggestion was further made that displacement of the epiglottis might be a factor in causing asphyxia neonatorum. (Col. Palmer's paper, read in December, 1923, was first published in the *Indian Medical Gazette* in April, 1928.) Further independent confirmation was forthcoming in 1931-2, in a short article published in *Schmerz-Narkose-Anaesthesie* by Robert Saniter. He notes the absence of any adequate reference to the matter in any of the current textbooks. He finds two fingers of the left hand, introduced well to the back of the throat, gripping the epiglottis, and lifting it up, with the base of the tongue, to be "incomparably more effective" than the usual methods of drawing the tongue forward or pushing the lower jaw forward. It often obviates the need for artificial respiration. He considers its immediate adoption as the method of choice, advisable in all cases of respiratory obstruction. In this present article G. H. Caiger deals in detail with the anatomy and physiology of the epiglottis and the mechanism of impaction. He concludes as follows: (1) The danger of epiglottic impaction during anaesthesia is not sufficiently recognized. (2) A considerable proportion of unexplained deaths under anaesthesia may be due to this unsuspected cause. (3) There are good and sufficient reasons for the lack of post-mortem evidence. (4) Digital examination of the larynx and release of the epiglottis has repeatedly saved

patients apparently moribund; this should always be borne in mind in respiratory failure. The article deserves to be widely read.

SHORTAGE OF PRACTISING MIDWIVES

The number of midwives on the roll in England and Wales is just over 65,000, and is increasing, but the number actually in practice as such is only some 15,600, or about 24%. The Central Midwives Board in its annual report speaks gravely of the shortage of practising midwives, stating that there are not enough of these women to staff properly the maternity institutions of the country, and many more are required for attendance on women confined in their own homes. That up to now there has been no serious deterioration in the standard of attention provided for the woman in childbirth is due to the devoted and self-sacrificing work of the midwives who are practising, but the decrease in their number, in the view of the Board, is now reaching such an acute stage that if adequate remedial action is not taken without delay there might be a breakdown in the maternity services. The position has been aggravated by the number of practising midwives who have been called away from maternity institutions for general nursing service with the armed Forces, though as some offset to this about 200 midwives have returned to practice after having retired on receiving compensation under the Midwives Act, 1936. But greater calls are being made on the midwifery service owing to the calling up of doctors and, in recent months, the rise in the birth rate. Not that there is any lack of pupil-midwives coming forward for training. The numbers who come forward would suffice for the proper staffing of the maternity service if all who completed the course practised as midwives afterwards, but only 58% of the women who enrolled as midwives in 1940 were practising as such in 1941. The others presumably found some other branch of nursing more attractive, though they considered it useful to hold the midwife's certificate. It is therefore not a question of lowering the educational or examinational standard, even if that were justifiable in any event. The C.M.B. is forced to the conclusion that a permanent solution to this problem can be achieved only by a substantial improvement in the general level of pay, in the conditions of service, and in the public regard for midwives. The appointment by the Minister of Health of the committee under the chairmanship of Lord Rushcliffe to review the salaries and conditions of service of practising midwives and pupil-midwives is welcomed whole-heartedly by the Board in the hope that some practical result may come about quickly.

LONELINESS IN INFANCY

While plans are being rapidly advanced for the accommodation of a quarter of a million little children in war nurseries it may be as well to take note of the observation that in infancy the loneliness involved in separation from home may be not only undesirable but lethal. In old age it is not uncommonly observed that when one of a happily married couple dies the other does not long survive. Dr. H. Bakwin (*Amer. J. Dis. Child.*, 1942, **63**, 30) suggests that the partnership of mother and infant may be no less vital, basing his conclusions upon observations made over a long period in the Bellevue Hospital, New York, and in other institutions. Twenty-five years ago the infant mortality rate in American foundling institutions was nearly 100%, and in the Bellevue Hospital about 40%. While an improved foster-home system lowered mortality, the failure of children to do well in hospital remained a problem. The "hospitalized" infant described by Dr. Bakwin sleeps less, passes more frequent stools, and is more subject to infections of the respiratory tract than his brethren at home. There is a marked dulling of reactivity to emotional stimuli: whereas babies of three months old, for example, normally smile in response to a friendly gesture, those in hospital fail to do so; they are listless and apathetic. There is a general lowering of resistance and delay or distortion in development. These symptoms cannot be accounted for by the illness which resulted in hospital admission, as the improvement on returning home is striking. At first the unsatisfactory progress of children in American hospitals was attributed to malnutrition; later, as nutritional standards improved, to cross-infection, nasopharyngitis succeeding malnutrition as the most frequent diagnosis. To lessen the danger of infections, the open ward was replaced by small cubicled rooms in which masked nurses and doctors moved cautiously lest they should stir up bacteria. Visiting parents were strictly excluded, and there was even devised a box in which a baby could be taken care of almost untouched by human hands. In spite of all these precautions the obstinate infants wilted in their cubicles and throve with humiliating promptitude when returned to their less hygienic homes. In desperation the paediatric policy was changed and mothering came to be regarded as essential in treatment. Interns and nurses were encouraged to pick up, cuddle, and play with their small patients, and parents' visits were welcomed. At the same time the infant mortality rate, which should logically have risen, fell sharply.

Although Dr. Bakwin refers especially to infants in hospital, he also stresses the unsatisfactory personality development in other institutions of children up to 4 years of age, his notes corresponding disturbingly with those of some observers in our wartime nurseries. Such children, especially if admitted before 2 years of age, find it hard to give or receive affection comfortably; enuresis or loss of bowel control is frequent, as are excessive egotism, aggressive behaviour or shyness, tempers, demanding of attention, finger sucking, and retarded speech. Obviously there are some admirable institutions in which these distress signals are comparatively rare, but it is no less obviously difficult to establish the perfect nursery in wartime, when the ideal staff is more than ever hard to find, and the demand enormously greater. The elderly hospital nurse who is too often in charge, with 15- to 18-year-old assistants as the bulk of her staff, is apt to look on the emotional needs of the small child as luxuries. Even those nurses and teachers who recognize the need for individual attention and tenderness are commonly too busy to supply the need. In day nurseries it is true that a child returns home each evening, but he is likely to find a mother too tired by long hours of war work to be loving and patient if the daily change from one environment to another makes him hard to handle, as well it may. Dr. Bakwin quotes a hospital case in which a child went steadily downhill until, "so weak that it seemed he might stop breathing at any minute," he returned the child to his mother, with the result of rapid and complete recovery. Such dramatic cases are presumably rare, but if, as seems established, the biologic unity of mother and little child cannot be disregarded with impunity, it is well to hesitate before supporting a policy that separates so many young children from their homes. It might even be better for the national effort to divert into the factories most of the large army of labour required to equip and maintain war nurseries and to leave the mothers to do the mothering of the "under fives." If this is not practicable, can we not have at least fewer and more motherly nursery homes?

War Medicine Series

The paper printed below is based on a lecture which was one of a series recently given at the British Postgraduate Medical School, Hammersmith

DYSENTERY AND DIARRHOEA IN WARTIME

BY

Sir P. H. MANSON-BAHR, C.M.G., D.S.O., M.D., F.R.C.P.

To parody Napoleon's famous dictum, "An army does not march, but may crawl, on its stomach." According to the Medical History of the war of 1914-18, bacillary dysentery took second place in importance among war diseases, and therefore it is up to us not to neglect the lessons taught. In this respect I think there is no need for us to repeat many of the mistakes that were made, some of which I will mention. Among those who directed the medical laboratory effort in that war were some who had had no previous experience of this problem, its many difficulties and pitfalls, so that we were fortunate to come out as well as we did on that occasion.

Classification of the Dysenteries

There is no such disease as "dysentery," and it no longer appears as such in Army and other returns. Dysentery connotes blood and mucus in the stools, diarrhoea, and abdominal colic. These appearances are produced by many different causes of ulceration or inflammation of the large intestine. One wonders sometimes why the Almighty in His wisdom created maladies so similar in their external and so dissimilar in their internal aspects as this group of "dysenteries."

We can classify it as follows: The first, the most important in wartime, is acute epidemic bacillary dysentery. It was of serious importance in operations in the Near and Far East; it was the main cause of the Gallipoli failure. No fewer than 120,000 casualties were evacuated from the Peninsula from July to November, 1915, and they were mostly due to bacillary dysentery, although other views commonly prevailed at that time.

It has been known as a very important war condition since Napoleon's retreat from Moscow; it was a factor, too, in 1870, in the South African War, and in many others.

The second group is the protozoal. This form, amoebic dysentery, on account of its more or less tropical distribution, appears to have attracted more attention than is its due. It is not the fatal disease that opinion supposes it to be. Amoebiasis is infection with *Entamoeba histolytica*; it is usually a chronic endemic disease. The complications are many because of the metastatic phenomena of this organism in its passage through the human body. Intestinal amoebiasis is originally the cause of hepatic or liver abscess; but *E. histolytica* is really a friend of man, endeavouring to live on the best of terms with him, and it is possible to harbour this parasite for the greater part of one's life without dire results.

Then there is a curiosity—*Balantidium coli*. This has been only once described in Great Britain, and that was in a mental patient, but it is said to occur among those who associate with pigs. Another form of dysentery is giardiasis (produced by *Giardia intestinalis*), a sort of spasmodic diarrhoea. It is extremely common in school children in this country, but has no real bearing upon the dysentery problem.

The next group is "helminthic dysentery," which is due to the Bilharzia genus of flukes. There is only one that is of vital importance—*Bilharzia mansoni*, named after Patrick Manson, who discovered it in 1903, and a common parasite of the Egyptian fellaheen. Since that time our knowledge of the life history of this parasite has become so complete and our methods of prevention so reliable that I do not think it is likely to figure in any future war. *Bilharzia haematobia*, in Upper Egypt and the Congo, may occasionally be the cause of dysentery; and in the Far East there is *Bilharzia japonica*, which, however, is much more a Chinese than a Japanese infection.

The differential diagnosis is very important, because in a country where we may encounter the whole gamut of dysenteries it is very necessary to distinguish one from the other. There are all these enigmatical forms of colitis which, when they occur in the tropics, are continually being ascribed to one or other of the better-known dysentery germs. I should put mucous colitis down as "sinner No. 1." It is common among business and intellectual people in this country, and very common in tropical countries as a manifestation secondary to bacillary dysentery.

Again, there is "ulcerative colitis," which is so common in this country at the present moment and is found also in most tropical countries. I do not think that this is a result of war, except that people who are being incessantly worried and bombed are more apt to reproduce this enigmatical disease, which is commonly associated with mental disturbances. In the last war I saw a number of people who suffered from symptoms of ulcerative colitis which lasted for some time, until the nervous shock passed off. It is extraordinarily like bacillary dysentery in its course and in the appearance of the mucous membrane when viewed through the sigmoidoscope. But it is really quite distinct from bacillary dysentery.

Next we have the great bogy of malignant disease. Carcinoma of the sigmoid flexure or rectum may give rise to blood and mucus in the stools, and because the patient is in the tropics or subtropics and passes blood and mucus in the stool his doctor very likely jumps to the conclusion that he has amoebic dysentery, especially if the stools contain Charcot-Leyden crystals, which tend to suggest amoebic origin. Malignant disease may give rise to this phenomenon and may simulate amoebic dysentery, but may also be a sequel to it.

Another condition to be considered is tuberculosis of the large intestine. This happens to be much more common in the tropics than in this country, and insemination of the tubercle bacilli in the mucous membrane, secondary to some other form of dysentery, takes place and is extremely difficult to differentiate except by sigmoidoscopic examination. Polyposis also produces blood and mucus in the stools; it has a Mendelian incidence, and nearly always terminates in malignant changes. The intestinal mucous membrane is studded with polypi, which resemble bunches of grapes. Simple polypus in children, especially in India and other endemic areas, is apt to be mistaken for one of the dysenteries. Digital or proctoscopic examination will often settle this point immediately.

Another condition which often produces blood and mucus in the stools in older men is diverticulitis: in those who complain of alternating diarrhoea and constipation and other uncomfortable phenomena it is advisable to keep this in mind.

Mercurial poisoning has also to be considered. Page and Wilson (*Lancet*, 1940, **1**, 640) recorded the occurrence of acute ulcerative colitis after cystoscopic examination of the bladder, the instruments having been washed in mercury oxycyanide. This has now been definitely proved to be due to mercurial poisoning; so that ulcerative colitis, which resembles that condition, may in reality represent an effort of the body to get rid of some toxin—not, of course, a metallic toxin—through the walls of the gut.

In the last war we had a lot of trouble, in differential diagnosis, with paratyphoid B, which is the cause of ulceration of the large intestine and blood and mucus in the stools. Subtertian malaria may produce an acute enteritis with intestinal haemorrhage and may be mistaken for amoebic dysentery. Another cause may be foreign bodies in the rectum or internal haemorrhoids, which may give rise to blood and mucus in the stools and be confounded with dysentery.

The Bacillary Dysenteries

Bacillary dysentery is a very large subject. Rather it should be called the "bacillary dysenteries." These occur in large epidemics; they have a seasonal distribution, and spread like wildfire. Epidemics of considerable magnitude often occur at the present day in Malaya, the Pacific islands, India, and Brazil. Nearly every new-comer to the tropics contracts bacillary dysentery at some time or other, children being especially

susceptible. Bacillary dysentery is endemic in nearly every mental hospital, and thousands are spent year after year in order to prevent it.

Most bacilli of dysentery have now been found in this country. I myself have isolated Shiga's bacillus in London. This organism was discovered in 1898. It produces definite biochemical and serological reactions, it is a most important organism in war, and it is the one against which we require the most potent anti-Shiga serum—which has now been prepared. Next comes Flexner's bacillus, discovered in 1900. Since that time, however, it has been found not to be one organism, but many. Bacteriologists had been devoting some of their energies to splitting up this bacillus until, at the end of the last war, they had found a great many varieties. That, of course, is *reductio ad absurdum*, and since then much good work has been done on reclassification. Flexner's bacillus is now considered to consist of six antigenic varieties, all having a connecting link. The anti-Flexner serum on the market is prepared from these six varieties.

The last-comer in this series is Sonne's bacillus, discovered in 1915, and which until recently had been rather neglected. Sonne's bacillus ferments lactose slowly and is a common organism in this country. It sweeps the community in epidemic form, producing diarrhoea with blood and mucus in the stools or a syndrome resembling food-poisoning. It is now known to be the organism concerned in infantile diarrhoea and in many endemic fluxes in all tropical countries, but occasionally it may reproduce the dysenteric syndrome as severe as in Shiga infections.

The Shiga bacillus produces acid out of glucose ; the Flexner group, acid out of mannite. They all give rise to specific agglutinins in the blood of injected animals. There are difficulties in serological diagnosis. Thus it is of no use in the acute stage of Shiga infections ; one does sometimes get a high agglutinin content from about the third week of the disease onwards in titres of from 800 to 1,000. The Flexner group is not nearly such a good "performer" ; and here the results are aways somewhat problematical, so that the only real value of serological diagnosis is in the chronic form of infection, in which the organism has produced chronic ulceration of the large intestine. In Sonne dysentery agglutination tests are usually more reliable. The stools are at first diarrhoeic and then mucus mingled with blood, resembling redcurrant jelly. The organisms are not always easy to isolate from the stools ; they produce a sort of blue-grey colony, quite different from many other organisms on the plate that give rise to red colonies. Microscopical examination of the cellular exudate in the stools affords a rapid and ready means of diagnosis. The preponderating form of cell is the polymorphonuclear, but there are also large macrophage cells which closely resemble amoebae and cause considerable confusion. In acute bacillary dysentery with death within thirty-six hours of onset the mucous membrane is cherry-red and friable, and one can almost rend it in pieces like damp blotting-paper. The last four feet of the ileum and the whole of the large intestine from the ileo-caecal valve down to the anal margin are in this condition. The next stage of coagulative necrosis is often very puzzling. These cases are known clinically as fulminating. Sometimes the necrosis is patchy and the appearance of the intestinal canal is that of islands of mucous membrane in a necrotic sea, and it is from these that regeneration eventually takes place. In the next stage the necrotic mucosa peels off like diphtheritic membrane. It is dead, and beneath it lies granulation tissue.

Difficulties in Diagnosis

The fact that dysentery bacilli disappear so quickly from the stools gives rise to difficulties in diagnosis. It enforces the plea that to work satisfactorily on these problems and to obtain rapid results and equally rapid cures we must place laboratories as near to the front as is possible, because when these cases arrive in a casualty clearing station or in a stationary hospital diagnosis can be rapidly made and measures be administered at the first possible moment so as to save the patient's life. An identity disk should be tied to the patient, stating that he has bacillary dysentery, and describing the treatment that has been given.

In microscopical sections a regular array of dysentery bacilli can be detected along the muscularis mucosae, and especially in the solitary follicles. Others taken later in the disease may show cystic degeneration of the mucous membrane, which is often a sequel to bacillary dysentery. An interesting point is the explanation of what is known as the "carrier state" in bacillary dysentery. Out of every hundred people affected about twenty become "carriers" for several months and the starting-point of fresh epidemics—for instance, they are considered to be the central point of every new outbreak of bacillary dysentery in India, and the bacilli persist in the mucous secretion of retention cysts in the bowel wall.

The appearance of the intestine in chronic bacillary dysentery is significant, reminding one of the cobblestones of some old French country town. It looks very much like chronic ulcerative colitis as encountered in this country, and has given rise to confusion between these two diseases. On taking cultures from these ulcers in the submucous sinuses the dysentery bacillus is usually found to be Flexner's. At one time thought to be a separate disease, chronic bacillary dysentery is one of the common causes of chronic diarrhoea in the tropics. It has been very difficult to know what to do in the way of effective treatment in such cases. In the last war the best results were forthcoming from surgical measures—appendicostomy or valvular caecostomy—but now sulphaguanidine is under trial.

Bacillary dysentery starts suddenly. It is an acute and toxic disease. Shiga's bacillus produces a virulent endotoxin, and the bacilli occur commonly only in the large intestine, but not in the blood stream, urine, or gall-bladder. Occasionally they have been isolated from the blood, but this is something of a fluke. They have also been found in the synovial exudate in dysenteric arthritis. A patient with acute bacillary dysentery usually has pyrexia. Therefore a dysentery with fever which commences suddenly is probably bacillary dysentery, and not amoebic, which is usually afebrile, as *E. histolytica* produces a cytolysin, but not a toxin. A patient with bacillary dysentery often vomits, but this does not take place in amoebic dysentery because it is not sufficiently acute. If the patient is a child, convulsions usher in the disease. These come first ; later, blood and mucus appear in the stools.

After the initial diarrhoea blood-stained mucus is passed in quantities ; generally the patient loses sphincteric control. Rectal tenesmus is very urgent, as is also dysuria, or painful micturition, due possibly to the spread of inflammation to the urinary bladder. The pulse is rapid and the tongue furred. Weight is lost at a tremendous rate, owing to dehydration. When the hand is placed on the abdomen the patient winces with pain: this degree of abdominal tenderness is never seen in amoebic dysentery. In bacillary dysentery one can palpate the spastic and contracted large intestine, which feels like a rubber band or tube: especially is this the case in the sigmoid colon, and it is acutely tender. In the more chronic forms of dysentery, particularly amoebic dysentery, there may be isolated tender areas, but there is not the generalized tenderness which is so characteristic of acute bacillary dysentery. The stools may vary from twelve to twenty-four in the day, or they may be uncountable. It is not correct to call them stools, but exudates, and often serum leaks out of the anus. What we should do then is to discard the bedpan and pack with tow ; in that way many lives have been saved.

Forms of Bacillary Dysentery

Bacillary dysentery may be divided into mild, acute, toxic or fulminating, and chronic forms. In the mild one gets diarrhoea, which lasts for forty-eight hours, with blood and mucus ; and Flexner's or Sonne's bacillus can usually be isolated. Shiga infections are as a rule much more severe ; but I do not believe that even in Gallipoli the death rate was ever more than 10% of those attacked. In the Fiji Islands and the Solomons in former days death rates of 40 or 50% were recorded among the natives, who blame the Europeans for its introduction. The fulminating form is so acute that the patient may die within forty-eight to fifty-six hours from the commencement. The stools contain dark clotted blood possessing a peculiar musty odour, but when green sloughs are visible prognosis is serious. One of the fatal signs in bacillary dysentery is hiccup. I personally have never seen

recovery in such a case. In children bacillary dysentery is an especially fatal disease, producing epileptiform convulsions, coma, and death.

Statistics regarding the geographical distribution of bacillary dysentery are often unreliable. For example, in one district of Central Africa statistics may record nothing but bacillary dysentery, and just a few miles away amoebic infections are said to predominate. Good and accurate statistics are returned by the British fighting Services, and there the two forms of dysentery are properly differentiated.

The great feature about bacillary dysentery is that it occurs in epidemics, which have a definite seasonal incidence. In North Africa, the Near East, and Iraq there are usually two epidemics during the year—one in the spring, and one, the more important, in the autumn, from August to November. There is also a good deal of evidence to show that bacillary dysentery is spread by house flies, and in their intestinal tract bacilli can be found; but there is no real evidence that it is carried by water, which appears to be the main vehicle of amoebic infection. There are milk-borne epidemics of Sonne infection in this country, but the starting-point in native communities is the carrier, and the passage of infection from one person to another by contact.

Complications of Bacillary Dysentery

The complications of bacillary dysentery are very characteristic. First of all conjunctivitis occurs about the tenth day, and iritis about the second week. There is also a dysenteric arthritis, which may be a poly- or a mono-arthritis. There may be synovial effusions, which begin suddenly, and all the joints of the body may be affected. The arthritis is often associated with pyrexia and rigors. It is curious that when the patient appears to be getting better and you think he is out of danger, then this sequel may make its appearance. Some observers say that they have seen hundreds of cases of bacillary dysentery and have never observed this; but it does not occur in every epidemic: in some the incidence is 25%. Sometimes dysenteric arthritis is confused with the gonorrhoeal form, which it somewhat resembles; but as a rule dysenteric cases clear up quickly and do not leave much disability behind. Then there is a dysenteric neuritis, and in the last war there was trouble with paroxysmal tachycardia, which occurred in convalescents and was probably due to the action of dysenteric toxins on the heart muscle.

(*The concluding part will appear in our next issue*)

RESEARCH IN THE U.S.S.R.

When the Germans attacked the Russians, the personnel of the U.S.S.R. Institute of Experimental Medicine gave up their long-term theoretical researches in favour of practical scientific problems. Last month they held a meeting, and Prof. Grashchenkov of the Moscow Neurological Clinic has cabled a brief report of the proceedings to this country. The main subjects discussed were the treatment of injuries of the nervous system and the control of certain epidemic diseases.

Treatment of Cerebral Lesions

Prof. Grashchenkov reported that in the last six months the neurosurgical clinic of the U.S.S.R. Institute of Experimental Medicine had treated 600 compound wounds of the head, in close collaboration with a mobile field hospital specially staffed and equipped, both surgically and radiologically, for neurosurgical work. As a result of this experience, Prof. Grashchenkov is strongly in favour of the use of sulphonamides. He recommends sulphanilamide, sulphapyridine, and sulphathiazole in varying mixtures and proportions depending on the variety of organisms disclosed on routine culture of the wounds. Brain abscess may supervene without at first giving rise to symptoms.

The treatment of aphasia and other focal brain lesions is carried out at a branch clinic of the Institute under Prof. Luria. Methods have been worked out for the restoration of normal functions. Prof. Kupalov, a pupil of Pavlov, considers that damage at the highest level interferes with the synthetic action of large areas of the cortex, with the production of torpor and neurotic complexes. Prof. Rosenthal, another pupil of Pavlov, has reported on the elaboration of temporary conditioned reflexes in a person with brain injuries. By means of this method he is trying to determine the degree of disturbance of the cortical processes and to estimate by the speed with which the temporary conditioned reflex develops the degree of recovery of function which may be expected. Other members of Pavlov's laboratory have employed prolonged sleep therapy by means of drugs, and have found this method particularly effective in cases of cerebral contusion. Details of the methods employed are not given in Prof. Grashchenkov's report.

Peripheral Nerve Lesions

Prof. Lavrentjev has studied various aspects of the regeneration of peripheral nerves and claims to have found evidence for the "chemico-motor role" of the peripheral segment in attracting nerve fibres to itself. Investigating the value of fixed pieces of spinal cord as transplants for bridging gaps after nerve lesions, he finds that the best results are obtained by using formalinized nerve, since this "quickly vascularizes itself and delays the proliferation of the connective fibrous elements of the scar." No details are given of functional recovery in animals or men after this procedure. The only means found for accelerating nervous regeneration was heat. For preventing the outgrowth of nerve fibres and the formation of neuromas Lavrentjev suggests ligation of the vessels of the nerve. Prof. Magnitsky presents a study of the chronaxie of peripheral nerve after full and partial disturbance of its functions. Prof. Orekhovich has studied the metabolism of degenerating and regenerating nerves and finds special histolytic enzymes at work during regeneration.

Louse-borne Typhus

Reports on investigations in infective diseases are of equal interest. Levkovich reported on the work, carried out at the laboratory of Prof. Smorodintsev, on the specific prevention and early diagnosis of typhus of the classical louse-borne type. For the first time it has been possible to carry out, in an epidemic area, a large-scale investigation of the effectiveness of a vaccine prepared according to a modification of the Weigl technique at the All-Union Institute of Experimental Medicine (it will be remembered that the original Weigl vaccine was prepared from the intestines of infected lice). At the same time the Cox vaccine, prepared from growths of *Rickettsia prowazeki* in the yolk sacs of developing fowl embryos, and treated with phenol and formalin, was tested under epidemic conditions. This vaccine had been supplied by the representatives of the American Red Cross. In animal experiments these vaccines were compared with the Durand-Sparrow vaccine made from the lungs of infected laboratory animals; it was established that the Cox vaccine is the most effective and the simplest to prepare.

In the same laboratory, work was carried out on the early diagnosis of typhus by means of a complement-fixation test performed at low temperature. This reaction is stated to be very sensitive and strictly specific, giving positive results as early as the first or second day of illness. The importance of such a result can hardly be over-estimated. Bengtson[1] in America has obtained positive results in endemic (flea-borne) typhus with a complement-fixation test in which she used as antigen a suspension of Rickettsiae; the reaction was positive as early as the sixth or seventh day of onset, and followed a course similar to that of the Weil-Felix reaction. A somewhat similar result was obtained in Q fever,[2] but these reactions were performed at 37° C. The earlier results in the Russian work are presumably due to the low temperature employed. These findings recall the work of Kahn,[3] who has found that the reaction which goes by his name is intensified if carried out at 1° C. In this case, however, Kahn considers that the strong reactions at low temperatures are of "general biologic type" rather than "syphilitic type." A fuller account of the Russian work will be awaited with interest.

1 *Publ. Hlth. Rep.*, Wash., 1941, **56**, 649.
2 Ibid., 1941, **56**, 327.
3 *Arch. Derm. Syph.*, 1940, **41**, 817.

Insecticides

Prof. Petrishcheva has investigated the possibility of using "local insecticide material" to be found in waste and cheap semi-processed products of the chemical industry and also in wild plants. Thus, for example, in one of the Siberian regions nearly 150 types of moss were found to have varying insecticidal powers, 50 of them in a high degree.

A number of insecticidal substances were tested against lice, and certain preparations were found to be highly effective when applied to clothing, or for the disinfestation of transport vehicles, including railway carriages. Details are not given in this communication, but Rossiysky[4] has previously written of the use of "nassecamoyad," a 10% solution of kerosene–carbolic soap, and of "solvent," a product of benzol and toluol, derived by fractional distillation and retaining their highest homologues. He states that the former destroys lice quickly and does not irritate the skin; its protective action lasts 2 to 4 days. The fumes of "solvent" destroy lice in 9 to 12 minutes; this substance causes, apparently, no harm to human skin. Russian workers have not recently made much reference to the heat treatment of clothing, but no doubt this is carried out, the latest researches having been directed towards the preparation of efficient insecticides. Chasovnikov[5] has written of the use of "solvent" in the field.

Treatment of Dysentery

Prof. Yermoleva reported on the use of lytic agents in intestinal disease. Bacteriophage has, of course, been used in bacillary dysentery for many years, notably by Compton[6] in Alexandria. The Russian contribution is the use of small amounts of sulphapyridine during phage treatment, and from this combination they report good results. Sulphapyridine treatment was described by Bobrovolskaia,[7] who gave it first to children suffering from dysentery in whom pneumonia was a complication. Its results were beneficial not only for the pneumonia but also for the dysenteric condition, and this finding led her to use it in uncomplicated cases, with excellent results. The dosage employed was small, not more than 0.7 g. being given in any one day, and the average total dosage being no more than 1.1 g. In other countries sulphapyridine, sulphathiazole, and especially sulphaguanidine are used in bacillary dysentery with striking success, but in larger doses than those quoted for sulphapyridine.

Other Researches

Prof. Khatanevel reported on a new method of rapid diagnosis in human tularaemia, which can be employed at an early stage of the disease and which can be used under field conditions. This author has written previously on the use of "tularin"[8] in early diagnosis; the test presumably depends upon a cutaneous reaction.

Prof. Tokin made an interesting report on a bactericide of plant origin. As a result of ten years' research with the help of a group of assistants he was able to establish that many plants have substantial bactericidal qualities, and that strong bactericidal principles are found in the ordinary turnip-like onion, garlic, radish, and probably in citrus plants. These bactericidal qualities are discernible in a vaporized state. Five, and in some cases three, minutes of the vapour of these plants is enough to inhibit and sometimes to kill certain organisms, such as streptococci and staphylococci and intestinal bacilli.

4 *Soviet Med.*, 1940, No. 3.
5 Ibid., 1940, No. 9.
6 *British Medical Journal*, 1942, **1**, 719.
7 *Soviet Vrachebuii J.*, 1941, April, p. 277.
8 *Arkh. biol. Nauk.*, 1941, **61**, No. 2, p. 3.

The Ministry of Health announces that, in view of the extreme shortage of rubber and the urgent need for conserving supplies for essential war requirements, it has been found necessary to restrict the sale of household rubber gloves to persons who are certified by a duly qualified medical practitioner to be suffering from (*a*) long and intractable eczema, or (*b*) cheiropompholyx, or (*c*) intractable dermatitis. Any person wishing to buy rubber gloves for such duties can do so only if her doctor certifies that she is suffering from one of these three conditions, and that the use of *household* rubber gloves is necessary for the performance of her household duties.

INDUSTRIAL HEALTH RESEARCH BOARD

The Medical Research Council has appointed the following to be the members of their Industrial Health Research Board during the period 1942-5: Earl De La Warr (*Chairman*), Prof. F. C. Bartlett, Brig.-Gen. A. C. Baylay, Dr. J. C. Bridge, Dr. A. N. Drury, Dr. T. Ferguson, Dr. M. W. Goldblatt, Dr. A. Bradford Hill, Dr. Donald Hunter, Prof. Esther Killick, Air Vice-Marshal Sir David Munro, and Mr. J. L. Smyth. Prof. A. W. M. Ellis, director of research in industrial medicine under the Council, will also attend all meetings. Dr. R. S. F. Schilling, one of H.M. Medical Inspectors of Factories, has been seconded to the service of the Council by the Ministry of Labour to act as secretary of the Board. The terms of reference of the Board have recently been revised and are now as follows:

"To advise and assist the Medical Research Council in promoting scientific investigations into problems of health among workers, including occupational and environmental factors in the causation of ill-health and disease, and the relation of methods and conditions of work to the functions and efficiency of body and mind; and in making known such results of these researches as are capable of useful application to practical needs."

AWARD FOR GALLANTRY

Dr. ERNEST VICTOR NEWLING, medical officer in charge of a mobile unit, Civil Defence Casualty Service, Westminster, has been appointed an M.B.E. (Civil Division). The citation in a *Supplement* to the *London Gazette* dated Aug. 28 reads: "During air raids Dr. Newling has led his unit with gallantry and calm efficiency. On many occasions he has carried out the treatment of trapped casualties in most difficult conditions with complete disregard of danger from the possible further collapse of demolished buildings. By his prompt actions and skill Dr. Newling has saved many lives."

Correspondence

Lister Technique in Emergency Surgery

SIR,—There can be no doubt—as Prof. R. J. Willan wisely pleads (Sept. 5, p. 291)—that the young generation of surgeons should master the Lister technique. It would enable them to deal successfully with emergency surgery. Also there can be no doubt that many loopholes of infection can be blocked by the addition of the Lister technique to the highly skilled surgical technique in the strict aseptic surroundings in present usage. For example, a spray containing an antiseptic directed upon a plaster-of-Paris cast during its removal would stop dust and inhibit the growth of micro-organisms it might contain. The only reason for a separate room for this process would be the possible disagreeable smell of a carbolic spray in a general ward. Prof. Willan rightly scoffs at the absurd notion that antiseptics so damage tissues as to prevent healing and their ability to deal with infection. Those who correctly make so great a point of excising all dead and injured tissues do not seem to estimate the actual damage done to healthy tissues by the passage through them of the sharpest scalpel.

Many misconceptions exist at the present time about Lister's technique. He excised all dead tissues from the burns and compound fractures he had to treat. Many of us who assisted Lister in public and private (in fact, he left me in charge of his patients when he retired) are alive, and can testify that his wounds healed by first intention with the greatest regularity.—I am, etc.,

London, S.W.1. G. LENTHAL CHEATLE.

A Classification of Nerve Injuries

SIR,—I hope I shall not be thought critical of the excellent work which Prof. H. J. Seddon and his unit are doing on peripheral nerve injuries if I protest at the new terminology of which he is the foster-parent (Aug. 29, p. 237). He seeks to distinguish three states of a nerve: complete division, division of axis-cylinders without division of the nerve-sheath, and

transient block. He proposes to call these "neurotmesis," "axonotmesis" (what a word! as Mr. Herbert would say), and "neurapraxia."

Our profession has suffered much at the hands of neologists, but even a helminth will turn. A new medical term should fulfil four requirements: it should be necessary, accurate, self-explanatory, and if possible euphonious. The most that can be said for these three is that the first two are accurate. "Neurapraxia" is the most objectionable, being actually misleading, since "apraxia" has for many years been the name of a psycho-physiological disturbance at the highest level. But why should we have to learn new words at all, when we can speak, in English, of "nerve-division," "nerve-contusion," and "nerve-concussion"?—I am, etc.,

London, W.1. W. RUSSELL BRAIN.

Prognostic Value of Blood Sedimentation Rate in Phthisis

SIR,—The paper by Drs. E. Lewis-Faning and M. Myers (Aug. 1, p. 125) on the prognostic value of the blood sedimentation rate (B.S.R.) in pulmonary tuberculosis is surely unreasonable in denying the value of serial tests in assessing the progress of the disease, while drawing important prognostic conclusions from a single test. A considerable volume of unpublished work at the Cheshire Joint Sanatorium points to the greater accuracy of conclusions drawn from serial results compared with those from a single test. Lynn, in an unpublished thesis, showed that the prognosis in patients with a fluctuating B.S.R. was almost as bad as in those with a rapid B.S.R., even though the final rate might be within normal limits. This work was carried further by Brooks, who showed that the prognosis was exceptionally good in patients discharged from the sanatorium with series of consecutive monthly B.S.R. readings within normal limits. The period of follow-up was six years.

I agree with the writers of the paper that B.S.R. estimation is not 100% accurate, but any case whose B.S.R. is not in keeping with the clinical and radiological condition is worth further investigation, as the following cases show:

1. A man with moderately advanced disease, in fairly good general condition, afebrile, and with a partially effective artificial pneumothorax, had a persistently very rapid B.S.R. (118–136 mm./2nd hour). On further investigation he was found to have a positive Wassermann reaction.

2. A girl was admitted with minimal tuberculosis. Her B.S.R. rose from 10 mm./2nd hour to 78 mm./2nd hour in three months. She was found to be pregnant, a fact she had succeeded in hiding until then.

A cold or a boil is commoner, but the increase in B.S.R. is less.

The cases with anomalously slow B.S.R. are rare, though there is a case in our recent records with radiological spread of disease accompanied by normal B.S.R. (including a normal sedimentin index). The few cases with positive sputum and normal B.S.R. seem to do well.—I am, etc.,

Cheshire Joint Sanatorium, Salop. A. CLARK PENMAN.

Megaloblastic Anaemia of Pregnancy and the Puerperium

SIR,—I wish to thank Prof. L. S. P. Davidson and Drs. L. J. Davis and J. Innes for their reply (Aug. 29, p. 256) to my comments (Aug. 15, p. 198) and for their elaboration of the grounds on which they base a diagnosis of a megaloblastic marrow reaction. If, as I understand from their letter, they include as megaloblasts not only the proerythroblast but also the megaloblast A of Israels, then I agree that where these latter cells were present in the cases quoted the diagnosis is justified. In my experience such marrows will also show megaloblasts B and C. I regret that my letter created the impression that I confine the term "megaloblast" to the haemoglobinated cell of Ehrlich. For the sake of brevity I included megaloblasts A, B, and C under the term "megaloblast series" in my diagram. All classifications of the erythroblasts must to some extent be arbitrary, for when does a boy become a man or, to use your correspondent's terminology, a megaloblast become a normoblast?

In fairness to Dr. Israels I must make it clear that he and I work at different centres, though in adjacent towns, and I deplore the exigencies of recent years which have prevented me from benefiting from direct personal tuition. I have adopted Dr. Israels's classification because I find it most useful in my own work and the least equivocal means of describing erythroblasts. In addition, it offers an explanation of the Ehrlich megaloblast and eliminates the description as "megaloblasts" of primitive red cells which may occur in significant numbers in normoblastic hyperplasias where deficiency of the liver factor plays no apparent part. On these grounds I regard the classification as both logical and practical and I should be glad to see it adopted as the standard terminology. In the meantime I feel that writers should "state their conventions" so that misunderstandings may be avoided.

I have no quarrel with the title "megaloblastic anaemia of pregnancy and the puerperium," which is obviously preferable to "pernicious anaemia of pregnancy." My doubts arise regarding the evidence on which certain of the cases are included as megaloblastic anaemias. If one could invariably infer the marrow reaction from the colour index, haematology would be much simpler but very much less interesting.

I have not studied the sternal marrow pictures of the few cases which have come my way where this type of anaemia was suspected. As treatment had already been instituted with both liver and iron, and recovery or partial recovery had taken place, sternal puncture seemed unlikely to be helpful. I have, however, seen one case following pregnancy with an initial high colour index progress to a normal blood picture on iron alone, after a brief course of liver in the early stages. I sincerely trust that no comment of mine will deter energetic treatment or cause any relaxation of vigilance until a normal blood count is restored and maintained.

Knowledge of these interesting and rare cases will be best forwarded if those in charge of obstetrical cases will, where possible, have a full haematological investigation carried out prior to commencing liver therapy if a megaloblastic anaemia is suspected.

In conclusion, I hope that no heat has been engendered by this exchange of correspondence. The doubts I have expressed arise from my interest in marrow interpretation and your correspondent's paper, and comments will be a stimulus to me in any future contact I may make with cases of this nature.—I am, etc.,

Manchester. M. L. THOMSON.

Counter-measures in Prolonged Hypoglycaemia

SIR,—An outline of the counter-measures worked out by psychiatrists who daily, in the active treatment of mental illness, purposely induce insulin coma may be of practical value to the profession—see Dr. E. H. Roche's report on two fatal cases of hypoglycaemia (July 11, p. 35), and the recent correspondence on increase of hypoglycaemia (June 13, p. 739; June 27, p. 802; July 18, p. 80). In insulin coma therapy, failure to wake after administration of glucose occasionally happens, and the counter-measures equally apply to "ordinary" accidental hypoglycaemia, with the difference that while in coma therapy everything is at hand to meet the emergency, arrangements may have to be improvised in general practice.

1. Failure to wake after ingestion of glucose is not alarming when caused by deficient absorption from the intestinal tract; the condition immediately responds to intravenous glucose.

2. Failure to wake after intravenous glucose is not always alarming, since this may be due to inadequate quantities of intravenous glucose—i.e., due to hypoglycaemia proper. Large quantities, up to 250 c.cm. of the 33% solution, may be required, and hypoglycaemia may reappear unless a sugar depot has been made available by intestinal administration.

3. Failure to wake after adequate intravenous glucose is alarming, and here the term "hypoglycaemia" is a misnomer, since coma has passed from the hypoglycaemic stage to the post-hypoglycaemic stage—i.e., unconsciousness persists despite normal or increased blood-sugar levels. For example, Dr. Roche's first patient showed hyperglycaemia from 5 hours after the onset of coma until his death 7 days later; his second patient had hypoglycaemia proper during the 8 hours of his life after the onset of coma.

Abnormal persistence of cellular changes brought about during hypoglycaemia is the cause, and the treatment is to combat cardiovascular collapse and to facilitate the entrance of sugar into the brain cells. Further administration of glucose is contraindicated, and blood-sugar tests help to dis-

tinguish this condition from hypoglycaemia proper. Where these tests cannot be done, or be done in time, the response or partial response to, or the failure of, previous intravenous glucose points the way. The states of hypoglycaemia proper and of post-hypoglycaemia are not necessarily as clear-cut as outlined here, and no harm is done to refractory cases of hypoglycaemia proper by applying to them the first stages of the treatment for post-hypoglycaemia, which is as follows: (1) Continuous inhalation of 5% oxygen–CO_2, since the brain cells may not be able to utilize sugar unless provided with an excess of oxygen. (2) Injection of vitamin B seems to act in a similar way, and massive doses up to 25 mg.—e.g., one ampoule benerva forte—are given both intravenously and intramuscularly. Massive doses of adrenal cortical hormone (cortin, percorten, etc.), up to 10 c.cm., are also given both intravenously and intramuscularly, and intravenous injection of 10 c.cm. to 30 c.cm. calcium chloride is recommended. (3) To combat dehydration and haemoconcentration, 500 to 1,000 c.cm. physiological saline is given by intravenous injection. The stomach is washed out and saline left *in situ*; in the absence of saline tepid water may be used. (4) Lumbar puncture and the withdrawal of as much C.S.F. as will flow is the next step, the rationale being to reduce increased pressure and to draw off the sugar accumulated in the fluid—i.e., following the same reasoning as in narcotic poisoning. (5) If the foregoing measures fail, blood transfusion may still save the patient.—I am, etc.,

Mawnan Smith, Falmouth. H. PULLAR-STRECKER.

An Alphabet of Breast-feeding

SIR,—In his excellent article Prof. Charles McNeil draws attention to the waste of food involved by the substitution of artificial feeding for breast-feeding. But is the logic of this quite sound? A nursing mother will require more food on account of her lactation. I believe she is actually entitled to an additional pint of milk on the priority system. It is perhaps as well that a good cause should not be supported by an unreliable argument. Probably most of us will agree that far too many babies are weaned at an early age, and Prof. McNeil's article will be a great help to many of us.—I am, etc.,

Pleasington, near Blackburn. P. K. MUSPRATT.

Anaesthetic Death in the Surgery

SIR,—I appreciate very much indeed the comments and advice of Drs. P. E. Woodroofe and A. D. H. Simpson (Aug. 29, pp. 263 and 264) relating to my article "Anaesthetic Death in the Surgery." There are occasions, however, when the type of apparatus or anaesthetic as mentioned by Dr. Woodroofe is not available, or it is impossible to find even a colleague to attend, much less a qualified anaesthetist; this happens frequently in a country practice such as mine is. Moreover, most G.P.s only keep chloroform and ether for general anaesthesia, as a rule for maternity cases only. Had such a fatality occurred, a coroner's inquest, with a possible prosecution, would have been the only result possible, and most of us know the pitfalls that face an unfortunate member of the profession involved in such procedures.

Though we are given the licence to practise medicine, surgery, and midwifery, it seems that such responsibilities should not be undertaken, and the rôle of the G.P. must give way to specialization. Must initiative and enthusiasm be sacrificed on the altar of timidity? For there is not the slightest doubt that as the years roll by the responsibilities for surgical practice are lifted from the G.P., not by reason of his inability to cope with such conditions but by reasons created in prosecutions which (when voiced in the Press) naturally intimidate other G.P.s from accepting such responsibilities, capable as they are of attending to whatever the condition may be. This throws a great deal of work on the hospital staff, on whom such responsibilities seem to rest, and this situation is accepted by the public whatever the outcome. Instead of a capable, enthusiastic, and keen young doctor gaining experience if he sets his mind on general practice, he grows to fear any condition that might involve him in the courts. The form G.P.45 (Rev.) condemns him, and gives him an inferiority complex, even if he could perform the service necessary without having to produce such evidence as is required.

More encouragement and more adequate protection are necessary to produce, or rather bring out, the best in G.P.s, who, after all, are the backbone of the profession.

In conclusion, I should like to mention a paper that was brought to my notice since publishing my case, "The Role of the Epiglottis in Anaesthetic Deaths," by Mr. G. H. Caiger, F.R.C.S. This factor is not mentioned in any of the textbooks so far as I can gather, and is undoubtedly a very important one to be remembered. It was published in the *Journal of Laryngology and Otology* of May, 1942.—I am, etc.,

Maltby. A. H. BARTLEY.

"Removal for Mental Observation"

SIR,—While appreciating the motives which inspired Dr. Arthur Harris's article on the above subject (Aug. 1, p. 136), one feels that any deficiency in dealing with the type of case described lies not in the method adopted by the practitioner but in the facilities offered by the general hospitals for their reception. When mental symptoms are present relations are only too pleased to have the patient removed, whether it be "for mental observation" or otherwise. Not only is nursing at home impossible, but examination of the patient often equally so. Two cases seen recently exemplify these points.

Case 1. Male, *aet.* 26, ex all-in wrestler, with history of fractured skull 12 months before, locked his bedroom door and entrance could be obtained only by forcing the lock. He was lying on the floor, refused to answer any questions, and resisted vigorously any attempt to examine him. In the struggle I was fortunate to note one unequal pupil. Removal was imperative—but to a mental observation ward or to a general hospital? The latter was chosen, but after doing a lumbar puncture under light anaesthesia, no other examination being possible, he was removed "for mental observation" and subsequently diagnosed as G.P.I.; *but* he was removed before any diagnosis could be confirmed. His retention in a general ward was obviously out of the question.

Case 2. Female, *aet.* 44: restless, talkative, obstreperous. Examination quite impossible. History negative. Diagnosis, ? hypomania. Paraldehyde in the doses suggested by Dr. Harris was given with the greatest of difficulty. After being quiet for about 2 hours she was discovered fully clothed having a bath at 2 a.m. Nursing at home was out of the question and she was removed "for mental observation" since no general hospital would have her.

The only way out of the difficulties enumerated by Dr. Harris would seem to be the provision of a mental observation ward in the general hospitals, staffed by nurses who are not afraid of mental cases as are the nursing staffs of most general hospitals, and where, given time and the facilities, organic nervous disease can be diagnosed when present.—I am, etc.,

London, N.6. W. LEES TEMPLETON.

Desert Sores

SIR,—Is it not possible that desert sores may be identical with the "boils and blains" inflicted upon the Egyptians in Biblical history, and that the condition may have been endemic in the Egyptian desert for thousands of years? It probably did not escape the observation of many doctors in general practice that a modified form of the same condition was prevalent in this country during last winter and spring. In my own practice the increase in cases of what may generally be described as "furunculosis" was very marked, and it seems that in some industrial towns in the Midlands it was also very prevalent. As a victim myself of successive crops (two or three lesions being present at a time) of a very unusual dermatosis, I may perhaps be allowed to attempt a description of it.

Usually starting as a small white-topped papule surrounded with a bright red areola and marked from the outset by its extreme painfulness, it gradually increased in diameter to the size of a halfpenny or even a penny. Nothing appeared to arrest its progress. Sometimes the skin was thinned out over it and almost transparent, while underneath was a purplish-blue exudate, due, presumably, to extravasated blood.

The ingestion of 50-mg. tablets of vitamin C made no impression, and when it was at its worst the advice of someone to try an injection of SUP 36 saved the situation so far as I was concerned, for I was at the time crawling round my practice with one of these lesions on each buttock. SUP 36, in fact, appeared to be a specific among a variety of other remedies tried. With the arrival of summer and an abundance

of natural vitamin C in the form of tomatoes and black-currants further outbreaks ceased.

The condition described would appear, then, to be due to a lack of natural vitamin C, synthetic vitamin C having very little therapeutic effect. An increased permeability of the capillaries appears to be the result of this lack of natural vitamin C, and it seems to show that the vitamin alone is not the whole story in such conditions. It is possible, perhaps, that natural vitamin C has some principle loosely combined with it and acting as a sort of catalyst which has not yet been identified by chemists. The lack of citrus fruits during the last 1½ years has probably led to a gradually increased deficiency of natural vitamin C in the blood and brought about an increased proneness to such skin lesions. People of fair complexion, as noted in myself and a few others, appear, as Capt. H. M. Rapport notes (July 25, p. 96), to be more susceptible. Several months after the initial lesion a purplish-blue stain remains under the skin, the lesion itself receding only very slowly. The skin was never actually broken.—I am, etc.,

Hove. G. L. DAVIES.

Tietze's Disease a Nutritional Deficiency?

SIR,—Among the many manifestations of subnutrition recently seen by us have been two cases of swelling of the costal cartilages, associated with weakness and lethargy, which conform to the description of Tietze's disease. Both cases have been investigated on the lines of Gill, Jones, and Pollak (*Journal*, Aug. 8, p. 155), with the same negative results. Estimations of the urinary excretion of vitamins have, however, given striking figures which support our view that this syndrome is not a disease *sui generis* but a local manifestation of malnutrition recognizable by deficiencies in vitamins C and B.

Case 1 was admitted to hospital, and the daily treatment in both cases was 700 mg. ascorbic acid and 2 drachms of baker's yeast incubated in a pint of peptolac. Daily estimations of urinary vitamin excretion serve to assess the degree of avitaminosis.

CASE 1 : MRS. A., AGED 36

Leading Symptoms	Ascorbic Acid per 100 c.c. Urine*	Pyruvic Acid	B_1 Direct Estimation	B_2
	mg.	mg.		mg.
Painful lump under right breast (6th, 7th, 8th costal cartilages). Lethargy, duration 1 year	0	4·75	30γ	0·25
	0	2·7	30γ	0·2
	10	3·0	50γ	0·2
	20	2·0	25γ	0·2

CASE 2 : MISS B., AGED 16

Loss of weight. Lassitude. Anorexia 3 months. Swelling of 4th and 5th R. costal cartilages	0 (1st day)	4·8	0	0·05
	2·5 (after 700 mg. ascorbic acid)	5·0	0	0·05
Normal standards	2·5	0·8	100γ	0·30

* Estimations were made on successive days.

One general practice cannot provide sufficient material to support a theory of this kind, but other workers more fortunately placed may be persuaded to follow the clue.—We are, etc.,

Caernarvon. GRIFFITH EVANS, F.R.C.S.
ROBERT O. EAMES, F.I.C.

Renal Infarction and the Goldblatt Kidney

SIR,—The annotation on hypertension and unilateral kidney disease (July 18, p. 75) has stimulated interest in a disease syndrome which increasingly takes its toll as time goes on. The experimental work of Goldblatt has, as has been stated, found its clinical counterpart in a number of reported cases of unilateral kidney disease in which the hypertensive blood pressure has resolved itself following the removal of the injured organ. No reference has been made, however, to the more frequently occurring cases of embolic infarction of the kidney, observations on which might furnish valuable evidence in the investigation of arterial hypertension. A short résumé is given below of such a case seen in conjunction with Mr. Robert Mailer of Glasgow Victoria Infirmary.

The patient, a man aged 39, enjoyed good health until the onset of inguinal hernia. Blood-pressure readings approximated 140/90. During the third week after his operation the patient experienced pain in the left lumbar region, and this was followed by profuse haematuria. The condition was typical of embolic infarction of the kidney. Subjective symptoms included severe discomfort at the back of the head, vertigo, throbbing, precordial pain, and general malaise. Blood-pressure recordings showed readings of 220/140. The lumbar pain persisted for several days, and the haematuria for more than two weeks. Repeated blood-pressure estimations revealed a gradually diminishing tension, reaching its pristine level of 140/90 one month after the onset of the complication.

This case, in its pathology and symptomatology, constitutes the clinical analogue of Goldblatt's experimental clamping of the renal artery. It is here described by the courtesy of Mr. Robert Mailer.—I am, etc.,

Glasgow. GEORGE KRASNER.

Bee Stings

SIR,—The article on bee stings by Dr. A. J. Jex-Blake (Aug. 29, p. 241) will interest many. Similar experiences obtain in South Africa. About 1926 a Pretoria tram was invaded by bees with disastrous results. One man was stung to death.

For some years I kept bees in the Free State. My experience and that of others was that many persons soon built up an immunity to stings. It was noted among some that failure to be stung at intervals meant loss of immunity. I have observed severe prostration after a single sting. Yet I have seen persons suffer hundreds of stings with little effect. Years ago I was the victim of such an experience in the Transvaal. Foolhardily I tackled a wild swarm without adequate protection. The invasion was summarily repelled. The drone of enemy planes seems as nought when compared with the hum of thousands of angry bees. A desperate run of nearly a mile ensued before the last attackers were shaken off. On my return journey I had a few more stings for luck. I was 14 years old at the time. My flight included a run down the boulder-strewn side of a steep kopje and at the bottom a clean and nimble leap over a four-foot fence. Years later I viewed the scene of the incident and recollected my accomplishments with astonishment. Well over 200 stings had to be removed from my face, neck, and arms. Despite a great shock of hair there were numerous stings in the scalp. I suffered no ill effect except much oedema of the face and intolerable itching.

Certain strains of South African bees are notoriously vicious, and it is remarkable the way they will wantonly attack persons or animals hundreds of yards away from the hive or nest. In East Africa the natives suspend the hives in trees. In the last war the Germans took advantage of this by shooting at the hives when attackers got within distance.—I am, etc.,

Cardiff. R. DRUMMOND.

Standardized Wassermann Reactions

SIR,—Dr. H. M. Hanschell's letter (Aug. 1, p. 141) makes depressing reading. His knowledge of complement-fixation tests must be scanty if he thinks that either the Ministry of Health or any other laboratory can send out complement standardized for use elsewhere. The value of this reagent depends on its interactions with the other components of the test and must be determined by each pathologist at the time he uses it. What the Ministry do guarantee is that the complement they send out is usable, and this is a most valuable aid to many laboratories.

With regard to dropping the Wassermann test in favour of precipitation tests, I personally do not agree. During the last 12 years I have performed an average of 7,000 Kahn tests a year, before which I had some training with Kahn himself when he was at St. Thomas's Hospital in 1928. In my hands this test is not so reliable as the Wassermann. It has some advantages—e.g., it becomes positive earlier than the Wassermann in primary syphilis—but I get too many false positive reactions, particularly in well-treated cases, for me to adopt it to the exclusion of the Wassermann. Nevertheless, I find it very useful as a confirmatory test. My experience with the Laughlen test was small, but it proved to be not so specific as the Kahn. Of all the precipitation reactions for syphilis (including the Kline reaction), I believe that the sigma test

is the most reliable, but unfortunately it is too time-consuming and laborious for routine use. Thus "the tacit approval, by the Ministry, of Wassermann tests as performed by approved laboratories" seems to me to be the correct attitude, but I should like the required standard of work to be higher.

The thought of a medical officer in charge of patients, even if he has had first-hand experience of all laboratory tests, popping in to the laboratory to do a batch of tests if need be fills me with apprehension. Surely the foundation stone of accurate work with serum tests is regularity of performance. But this does not, and should not, exclude the pathologist from doing regular clinical work and thereby keeping in touch with patients. In short, the pathologist of a V.D. clinic should be a clinical pathologist.—I am, etc.,

L.C.C. (Whitechapel) Clinic, E.1. I. N. ORPWOOD PRICE.

Lathyrism and Vitamin B_1 Deficiency

SIR,—At the close of your interesting annotation on "The Wernicke Syndrome and Vitamin B_1 Deficiency" (Aug. 29, p. 249) you suggest that antivitamin factors may prove to be the cause of other obscure nutritional diseases. A number of years ago, in collaboration with Lieut.-Col. L. A. P. Anderson, I.M.S., and Sir Albert Howard (*Ind. J. med. Res.*, 1924, 613), it was shown that lathyrism resulted most probably from the ingestion of foodstuffs prepared from the seeds of *Vicia sativa* var. *angustifolia*, and not, as had been assumed previously, from the seeds of *Lathyrus sativus*. The possibility of vitamin deficiency in the diet of the experimental animals was excluded, and we suggested that the disease was caused by the glucoside, vicine, or its aglucone, divicine, both of which were found experimentally to be toxic. It now seems to me to be more probable that vicine, or possibly some other constituent of the seeds of the vetch, inhibits the activity of aneurin or some other member of the vitamin B complex. It is hoped that someone more favourably placed than I now am may investigate the validity of this suggestion.—I am, etc.,

Bangor, N. Wales. J. L. SIMONSEN.

Draining the Ectopic

SIR,—There have been several accounts in the *Journal* (1942, **1**, 640, 669, 722) during the past few months of the delivery of ectopic pregnancies of viable age. In each case a drainage tube was introduced and in some was followed by a long period of invalidism. I wish therefore to call attention to the fact that, where the placenta cannot be removed entirely (sometimes a simple procedure), the abdominal wall can be sutured completely over the secundines without any fear of after-effects. The power of autolysis of the placenta is so great, and its connexion with the maternal blood supply so intimate, that it disappears after a few months. To introduce infection to it by means of a drainage tube will ensure a prolonged convalescence with fistula and adhesion formation. Pus, not placenta, discharges from the drainage tube. When a lithopaedion is discovered its placenta is non-existent.—I am, etc.,

FRANK STABLER,
Surgeon Commander, R.N.V.R.

Self-medication and the Chemist's Shop

SIR,—Dr. E. L. Loewenthal's letter (Aug. 15, p. 199) was one of the most interesting and intelligent that has appeared in the *Journal* for some time. He hits one nail very squarely on the head when he writes, "The more effective the preparation the more dangerous it is . . . without medical supervision." To the examples he gives I would add a well-known cough syrup which will keep the cough under a very fair degree of control until cavities have appeared in the lung. I believe I am right in saying that we are now up against an enormously powerful vested interest, and that something like 90% of the patent medicines sold in this country are controlled from the financial end by one group.

The average chemist probably does not want to prescribe, and it is doubtful if he wants to "muscle in" on the territory of other branches of retail trade. But so long as the dispensing doctor continues to take away his legitimate dispensing trade he is left with but little option if he is to remain in business at all. One point, however, the would-be reformer must keep in mind. There has grown up in some parts of the country a belief or superstition that "doctor's medicine" has a magical superiority over any sold over the counter. Who in the profession that dispenses has not heard, "I thought it was time I had some doctor's medicine"? Again, there is a similar superstition that the chemist who does N.H.I. dispensing keeps only inferior drugs, and one's offer of a prescription may be refused on that ground.

Dr. Hermann Levy's statement (Aug. 29, p. 265) that "the English have a certain proneness" to self-medication is merely a statement of the truism that the English are a very gullible people. Possibly the real essence of democracy is that they should be permitted to continue to allow themselves to be gulled, but the profession in its fight against osteopaths, chiropractors, faith-healers, etc., has never shown any leaning towards that doctrine. One of the advantages of a State Medical Service is that we should be in a very much stronger position *vis-à-vis* those who make large fortunes by peddling to all and sundry drugs the capabilities of which are utterly unknown to them; another is that we should find ourselves freed from the necessity of competing with the chemist as retail tradesmen.

I wonder if Dr. Loewenthal is aware of the difficulty which the B.M.A. experienced in obtaining any newspaper publicity for *Secret Remedies* and its sequel.—I am, etc.,

DONALD M. O'CONNOR.

Hypnosis

SIR,—I thought your leading article on the present position of hypnosis (Sept. 5, p. 283) did not sufficiently stress one important point, in that the hypnotic state is related to the transference situation obtained in the preliminary stages of psycho-analysis. Psycho-analysis proceeds to render this situation conscious to the individual, whereas hypnosis does not generally do so. The point is that transference is proceeded with to obtain the necessary deeper analysis, whereas hypnosis serves to keep transference maintained, and builds up resistance to any deeper analysis. Jones mentions this in his book, *Papers on Psycho-analysis*. No doubt when a skilled psycho-analyst discovers his dream of paradise by securing as a patient a spiritualist medium suffering from hysteria, and endeavours to treat this entrancing combination by hypnosis, some further delectable expressions of opinion may obtain.—I am, etc.,

Tipton, Staffs. L. H. EUNSON.

Hyperostosis Frontalis Interna

SIR,—Dr. J. MacKay Crawford (Aug. 29, p. 261) is, of course, quite right and I apologize for the slip. The tolerance to glucose was reduced, not increased, in my case, as evidenced by the definite rise in blood sugar.—I am, etc.,

Truro. C. T. ANDREWS.

Universities and Colleges

UNIVERSITY OF CAMBRIDGE

At a Congregation held on August 28 the following medical degrees were conferred:

M.D.—By proxy: E. W. Hart. In person: W. A. Law.

M.B., B.CHIR.—By proxy: P. Hugh-Jones, D. McAnally, G. P. Baker, W. E. Church, H. G. Danziger, G. E. Ffrench, H. D. Juler, J. M. S. Knott, H. E. Lockhart-Mummery, L. H. H. May, J. C. Waterlow, P. H. Buxton, P. M. Daniel, G. H. Dhenin, F. S. Glassow, A. Hulme, R. J. Walker, B. G. C. Ackner, P. F. Borrie, J. A. B. Gray, E. J. Holborow, H. W. F. Jones, T. D. Kellock, D. S. Short, J. F. P. Skirmshire, J. C. Swanson, J. R. Thompson, T. O. Candler, A. G. Eddison, E. J. Harrison, D. E. R. Kelsey, A. Lyell, R. A. Palmer, S. H. Purser, D. L. Sandes, J. F. R. Withycombe, W. B. Alexander, A. O. Bech, J. A. Black, N. F. Crofts, R. E. Danckwerts, J. H. L. Ferguson, J. L. Fluker, J. B. Foote, R. A. Holden, E. B. Jarrett, A. G. Leacock, C. M. Phillips, P. M. M. Pritchard, J. H. B. M. Rowlands, H. D. Teare, J. B. Wyon, R. J. K. Brown, N. D. Compston, P. J. R. Deller, F. M. Lancaster, K. T. Lockhart, R. G. Miller, E. C. Poulton, E. G. Sita, R. U. Whitney, D. I. Williams, C. D. Calnan, D. G. R. Fox, J. S. Pippard, J. R. K. Preedy, F. S. Carter, G. F. Green, A. W. N. Oatway, T. O. Scudamore, R. H. Wheeler, J. Dean, R. Dobson, H. G. McQuade, R. H. Meara, W. E. S. Bain, T. L. T. Lewis, D. Rice, N. L. Birkett, B. F. Brearley, E. G. A. Crawshaw, J. A. Peters, J. F. P. Quinton, P. K. Renshaw, J. K. Wagstaff, R. B. Welbourn, M. R. Jeffrey, H. M. Lawson, C. R. Naish, H. P. König, L. R. McLaren, J. J. Wild, and H. I. Winner. In person: V. R. Arulanandom, N. J. Goorney, H. M. J. Rowan, J. A. V. Bates, R. D. Sweet, I. Macdonald, J. G. Salter, E. C. E. Golden, W. S. S. Ladell, R. W. Danziger, and R. G. Mathers.

During July and August the titles of the degrees of M.B., B.Chir. were conferred on A. Bolton and Mrs. P. Eskell (Newnham College) and F. H. Lomax and M. L. Macalister (Girton College), and of M.B. on Mrs. C. M. Hall (Newnham).

UNIVERSITY OF LONDON

LONDON (ROYAL FREE HOSPITAL) SCHOOL OF MEDICINE FOR WOMEN

The following scholarships have been awarded for 1942-3:

St. Dunstan's Medical Exhibition, Miss W. E. Lewington. *St. Dunstan's Medical Exhibition (Supplementary)*, Miss S. Rollin. *A. M. Bird Entrance Scholarship*, Miss G. Smith. *Mabel Sharman-Crawford Scholarship*, Miss P. J. Lockley. *Sir Owen Roberts Memorial Scholarship*, Miss E. J. Harman. *A. M. Bird Scholarship for Clinical Studies*, Miss M. E. Townsend. *Alfred Langton Scholarship*, Miss C. M. Watt. *Ellen Walker Bursary*, Miss E. T. Brash. *Flora Murray Bursary*, Miss D. M. Phillips. *Emma Beilby Bursary*, Miss H. B. Hill and Miss E. E. Simpson. *John Byron Bursary*, Miss D. A. Chapman and Miss B. M. Goetzee. *A. M. Bird Postgraduate Scholarship in Pathology*, Miss F. D. Bosanquet, M.B., B.S.

Obituary

V. WARREN LOW, C.B., M.D., F.R.C.S.

The announcement of the death, which took place on September 2, of Mr. V. Warren Low will be received with regret by a wide circle of friends and colleagues. He was associated with St. Mary's Hospital during almost the whole of his career, first as a student, then as a member of the staff, rising to the position of senior surgeon, and afterwards as consulting surgeon and vice-president of the hospital.

Vincent Warren Low was born in 1867 at Staines and was educated at Cranleigh. After his training at St. Mary's he graduated M.B. at the University of London in 1892, and B.S. with first-class honours in 1893. In that year he became a Fellow of the Royal College of Surgeons, and two years later proceeded M.D.Lond. At the outbreak of the Boer War he went out with the South African Field Force as a civil surgeon, served with distinction, and gained the Queen's medal and seven clasps. On returning he became assistant surgeon to the Royal Northern Hospital, and shortly afterwards assistant surgeon to St. Mary's, where in due course he became full surgeon and lecturer on surgery in the medical school. During the last war he was consulting surgeon to H.M. Forces in the Dardanelles and Egypt, with the temporary rank of colonel, A.M.S., and in that capacity again he did distinguished service for his country, was mentioned in dispatches, and was made Commander of the Bath.

The Royal College of Surgeons claimed a great deal of Low's interest for many years. From 1916 onwards he was a member of its Council and from 1928 to 1939 a Vice-President. He served the College as a member of the Court of Examiners, and he was also at various times examiner in surgery to the universities of Cambridge, London, and Liverpool. For some years he was a member of the University of London Senate. He could be described as a great "hospital man"; he was a member of the Council of the King Edward's Hospital Fund for London, and consulting surgeon to several cottage hospitals in the metropolitan area. Another institution in which he was greatly interested was the Royal Seabathing Hospital at Margate, of whose committee of management he was a valued member. An important office he held for many years was that of chief consulting surgeon to the L.M.S. Railway Company.

In medical society life Warren Low was always a popular figure. He was not a brilliant or frequent speaker, but he was a great listener, even after partial deafness had robbed the meetings of some of their interest for him. His countenance continued to radiate cheerfulness, even in his later years of disability, and his humorous turn of speech, often in the vein of happy reminiscence, made his rare interventions either in business or scientific discussion always welcome. He was an old member of the Medical Society of London; his first contribution to its *Transactions* appeared more than forty years ago. Eventually he became one of the trustees of that society and as far back as 1919 its president. He was also prominent in the Royal Society of Medicine and was its president in 1932-4. He had previously been president of the Section of Surgery. His old students have occasion to remember with gratitude the excellence of his teaching, but he attempted no ambitious writing. He was prominent in the Masonic fraternity, a Past Master of the Sancta Maria Lodge attached to St. Mary's Hospital, and a member of the United Grand Lodge of England. He was also president of the Society for the Relief of Widows and Orphans of Medical Men. He was Junior Warden of the Society of Apothecaries, which he joined in 1914 and in which he took great interest, not having missed a single meeting of the Private or Full Court after becoming an Assistant.

DAVID WATERSTON, M.D., F.R.C.S.ED.

We regret to announce the death of Prof. David Waterston, which took place on Sept. 4 in Edinburgh at the age of 70. He had held the Bute Professorship of Anatomy at St. Andrews for 28 years.

Waterston was born in Glasgow, the son of the Rev. Richard Waterston, for many years Free Church minister in Dundee. He studied medicine in Edinburgh and graduated M.A. in 1891, M.B., C.M. with honours in 1895, and M.D. with gold medal in 1900; he took the F.R.C.S.Ed. in 1898 and in later life was elected F.R.S.Ed. For twelve years he was demonstrator of anatomy at Edinburgh University and he held the Crichton Research Fellowship in anatomy for three years. In 1909 he became professor of anatomy at King's College, London, resigning in 1914 on his election to the chair at St. Andrews. He was Arris and Gale lecturer at the Royal College of Surgeons of England in 1914-15 and Struthers Memorial Lecturer at the Royal College of Surgeons of Edinburgh in 1927. He represented St. Andrews University on the General Medical Council for ten years and served also for some time as a member of the Dental Board. He joined the British Medical Association in 1898, and was vice-president of the Section of Anatomy in 1906 and of the Section of Anatomy and Anthropology in 1939. At the Bournemouth Annual Meeting he opened a discussion on the mechanism of pain, and the text of his paper was published in the *British Medical Journal* of December 15, 1934.

Waterston was deeply versed in his own subject, and his reputation as a teacher was high. He was the author of *Anatomy in the Living Model*, which embodied his Arris and Gale lectures, and edited the *Edinburgh Stereoscopic Atlas of Anatomy*; he also contributed papers on anthropology, embryology, and comparative anatomy to scientific journals and the publications of scientific societies. He was one of the pillars of the James Mackenzie Institute for Clinical Research from the time of its foundation at St. Andrews and acted as its honorary consultant; he also served on the local town council, and was a well-known figure on the links of the Royal and Ancient Club. A memorial service was held on Sept. 9 in the University Chapel, St. Andrews.

The Services

The King has approved the following appointments and awards in recognition of gallant and distinguished services in the Middle East during the period Nov., 1941, to April, 1942.—*C.B.E. (Military Division).*—Acting Brigadier G. F. Allison, M.C., late R.A.M.C.; Temp. Brigadier J. Walker, M.C., late R.A.M.C. *O.B.E. (Military Division).*—Acting Brigadier R. R. G. Atkins, M.C., R.A.M.C.; Temp. Cols. J. S. K. Boyd, H. V. Leigh, G. S. McConkey, and R. F. Walker, M.C., R.A.M.C.; Major (Temp. Lieut.-Col.) K. Fletcher-Barrett, R.A.M.C. *M.B.E. (Military Division).*—Capts. (Temp. Majors) P. B. Ascroft, W. A. Oliver, L. S. Rogers, and H. B. Stallard, R.A.M.C. *M.C.*—Capt. (Temp. Major) E. F. S. Morrison, R.A.M.C.; Capts. R. D. D. Birdwood and V. Rangachari, I.M.S.

Mentions in Dispatches.—Capt. (Temp. Major) R. A. Smart, R.A.M.C.; Major (Temp. Lieut.-Col.) H. W. Mulligan, I.M.S.

Temp. Surg. Lieut.-Cmdr. H. G. Rees, R.N.V.R., has been appointed an O.B.E. (Military Division) and Temp. Surg. Lieuts. P. W. Isaac and C. H. F. Wood, R.N.V.R., M.B.E. (Military Division) for endurance and devotion to duty when H.M.S. *Cornwall* and H.M.S. *Dorsetshire* were sunk by Japanese air attacks in the Indian Ocean.

The D.S.C. has been awarded to Surg. Lieut.-Cmdr. B. S. Lewis, R.N., for gallantry in an action which resulted in the safe passage to Malta of an important convoy, and Surg. Lieut. G. N. Reed, R.N., and Temp. Surg. Lieut. R. R. Wethered, R.N.V.R., have been mentioned in dispatches.

The D.S.C. has been awarded to Surg. Cmdr. L. Lockwood, R.A.N., for bravery and endurance when H.M.A.S. *Hobart* was taking convoys across the China and Java Seas in the face of sustained enemy air attacks.

Medical News

At a sessional meeting of the Royal Sanitary Institute to be held at Oldham Town Hall on Sat., Sept. 26, Dr. E. R. Peirce will read a paper on "The Control of Sea- and Air-borne Disease."

The Medical Research Council invites applications from medically qualified women for a studentship for training in methods of experimental psychology; preference will be given to candidates who have had some special training in physiology or neurology, or who have already had some experience in the use of research methods. The studentship will be tenable for six months, during which the holder will receive training under the direction of Prof. F. C. Bartlett at Cambridge. Payment will be at the rate of £350 per annum, and the student will be expected to give her whole time to the work. The award will be made with a view to possible opportunities for research into problems arising during the war, either in the Services or in industry, but no definite promise of employment after the expiry of the studentship can be given. Applications should be lodged with the Secretary, Medical Research Council, c/o London School of Hygiene, Keppel Street, London, W.C.1, by Oct. 5. Forms for the purpose will be supplied on request.

Sir Stanley Woodwark, M.D., F.R.C.P., has been elected Master of the Barbers Company. He has also been re-elected for a further year to be Master of the Society of Apothecaries. The famous Hall of the Barbers Company, which survived the Great Fire of London in 1666, was destroyed by the air raid on London at the end of December, 1940. Mr. John Howell Evans, F.R.C.S., has been elected Renter Warden of the Barbers Company.

Dr. James Aubrey Ireland of Shrewsbury has been elected an Alderman of the Salop County Council.

EPIDEMIOLOGICAL NOTES

Discussion of Table

In *England and Wales* a further large rise in the incidence of measles, 924 cases, occurred during the week. A small drop, 23 cases, was recorded for whooping-cough. The notifications of scarlet fever, diphtheria, and dysentery rose by 123, 88, and 32 respectively. In the case of diphtheria this trend was fairly general throughout the country, the only county with an appreciable increase being Lancashire, with 27 cases more than in the preceding week.

The largest rises for scarlet fever were in Lancashire 27, Yorks West Riding 25, Staffordshire 19, and Wales 27.

Of the 18 notified cases of typhoid 9 occurred in Buckinghamshire, Aylesbury R.D.

Whooping-cough showed considerable fluctuations. The largest deviations were a drop of 34 cases in London and a rise of 32 in Lancashire.

The higher incidence of dysentery, 32 cases, was due to small widely dispersed outbreaks. The only local outbreaks of any size were those of Shropshire, Oswestry R.D. 9 cases, and Glamorgan, Pontypridd U.D. 8.

In *Scotland* during the week there were 338 cases of scarlet fever, an increase of 66. The largest of the local rises was in Edinburgh—53 cases, compared with 29 in the preceding week. The increase in the incidence of dysentery, from 69 to 86 cases, was due to outbreaks in the Northern and North-Eastern areas; in the counties of Zetland, Kincardine, and Aberdeen there were 13, 14, and 14 cases respectively.

In *Eire* returns included a case of typhus fever notified in the Rural District of Kanturk, Co. Cork.

Whooping-cough

The possibility of controlling whooping-cough by inoculation is being actively pursued. This disease is the most deadly of infectious diseases among infants. During the five years before the war the numbers of children under 1 year of age dying from the principal infectious diseases of childhood were: whooping-cough 4,196, measles 2,212, diphtheria 380, and scarlet fever 80. It is announced in the September issue of the *Monthly Bulletin* of the Emergency Public Health Laboratory Service that the effectiveness of pertussis vaccine for immunization is to be investigated by a large-scale field experiment. The trial is to be made with children aged 6 months to 3 years, who are to be kept under observation for at least one year. The results obtained will be compared with a control series of similar age and living under the same environmental conditions.

Returns for the Week Ending September 5

The notifications of infectious diseases during the week in England and Wales included: scarlet fever 1,472, whooping-cough 1,197, diphtheria 787, measles 3,024, acute pneumonia 379, cerebrospinal fever 73, acute poliomyelitis 24, dysentery 112, paratyphoid 13, and typhoid 7.

No. 34

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended August 27.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1942					1941 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	66	3	20	2	5	112	10	38	2	8
Deaths		—	1				—	—		
Diphtheria	717	40	173	50	13	746	29	202	17	31
Deaths	16	—	2	2	1	22	2	5	1	5
Dysentery	91	16	86		—	170	25	41		—
Deaths			—	—	—			—	—	—
Encephalitis lethargica, acute	3	—	—		—	2	—	—		—
Deaths		1	—				—	—		
Enteric (typhoid and paratyphoid) fever						49	1	2	11	5
Deaths						2	—	—	—	—
Erysipelas		—	46	4	3		—	41	10	4
Deaths		—	—				—	—		
Infective enteritis or diarrhoea under 2 years				161						
Deaths	54	4	19	30	8	32	5	7	22	7
Measles	3,165	273	72	13	18	1,454	62	17	76	6
Deaths	2	1	1	—	—	—	—	1	1	—
Ophthalmia neonatorum	94	1	16	—	—	92	5	19	—	—
Deaths										
Paratyphoid fever	11	1	1	—	—	195	6	9	—	—
Deaths	—	—	—	—		1	—	—	—	—
Pneumonia, influenzal*	352	20	7	—	1	372	14	3	—	2
Deaths (from influenza)	11	1	1	—	—	4	10	—	—	3
Pneumonia, primary			97	10				126	7	
Deaths		15		10	8		—		6	—
Polio-encephalitis, acute	2	—				—	—			
Deaths		—					—			
Poliomyelitis, acute	14	1	—	6	—	24	2	3	4	1
Deaths		—	—				—	—		
Puerperal fever	—	2	11	4	—	—	—	17	2	1
Deaths		—					—			
Puerperal pyrexia	168	13	11		4	118	6	15		—
Deaths										
Relapsing fever	—	—			—	1	1			—
Deaths										
Scarlet fever	1,455	100	338	41	25	811	26	159	23	21
Deaths	—	—	—	—	—	—	—	—	—	—
Small-pox	—	—	—		—	—	—	—		—
Deaths		—	—	—	—	—	—	—	—	—
Typhoid fever	18	1	—	5	—					
Deaths	2	—	—	—	—					
Typhus fever	—	—	—	1	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough	1,212	107	30	82	3	3,144	240	54	38	3
Deaths	9	3	—	1	1	19	3	2	2	—
Deaths (0–1 year)	284	32	62	51	29	241	21	52	31	22
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	3,601	522	521	164	119	3,637	462	549	147	126
Annual death rate (per 1,000 persons living)			11·7	10·9	†			12·0	9·8	†
Live births	5,938	691	873	442	267	5,421	459	871	330	210
Annual rate per 1,000 persons living			18·1	29·5	†			17·7	21·9	†
Stillbirths	207	15	26			198	25	29		
Rate per 1,000 total births (including stillborn)			29					32		

* Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

† Owing to evacuation schemes and other movements of population, birth and death rates for Northern Ireland are no longer available.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1.

ORIGINAL ARTICLES AND LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

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B.M.A. SCOTTISH OFFICE: 7, Drumsheugh Gardens, Edinburgh.

QUERIES AND ANSWERS

Aspirin for Asthma

A. K. (Manchester) writes: I have a lady patient, aged 64 years, with bronchial asthma of many years' standing. She tells me 2½ gr. of aspirin gives her 36 to 48 hours' immunity from wheezing and she sleeps all through the night. Occasionally she takes only 1½ gr. of aspirin to produce the desired result. Is there any pharmacological explanation in support of her findings? She assures me it has never failed her.

Auscultation in Non-penetrating Abdominal Injuries

Dr. F. PIERCE HUDSON (Liverpool) writes: Dr. H. P. Tait, who inquires about the value of auscultation as an aid in the diagnosis of non-penetrating abdominal injuries (Sept. 5, p. 300), may be interested in the following case I encountered last week. A girl of 2 years was admitted to hospital 7 hours after falling down some stairs. She was very severely shocked. Her general condition and the difficulty of diagnosis delayed operation for 24 hours. On three occasions before operation I auscultated her abdomen and heard peristaltic movements in all areas. At operation the small bowel was found to be ruptured in two places and there was general peritonitis.

Blood Injection in Tuberculosis

Dr. B. JUHN (Kenton) writes in reply to Dr. J. H. Fletcher (Aug. 22, p. 236): Since Wassermann's and Neufeld's papers about immunity in tuberculosis there were not many new discoveries in this very difficult field. Besides the different strains of the tubercle bacillus the tissue allergy and the tissue immunity play a very important role. Although active immunity will be the aim in the prevention and cure of tuberculosis, numerous sera for passive immunization were tried (Maragliano, Marmorek, Koch, Behring) without success. According to C. Spengler the protective bodies against tuberculosis are not present in the serum but in the red blood corpuscles. His preparation "I.K." was obtained from erythrocytes. It was completely ineffective. Although the humoral immunity plays certainly a smaller part in prevention and cure of tuberculosis than the cellular, I tried repeated blood transfusions in cases of exudative tuberculosis, the donors being cases of healed fibroid tuberculosis. The number of cases so treated is too small to be conclusive.

LETTERS, NOTES, ETC.

Apple, Pear, and Carrot Treacle

Dr. E. H. STRANGE (Stamford Hill, N.16) writes: May I draw the attention of practitioners in country districts and of those supervising factories with canteens to a very valuable national source of food often allowed to go to waste? Inferior varieties of apples and pears, and those affected by the attack of the codlin moth and the saw-fly, as well as those of poor keeping qualities, are allowed to rot in this country in enormous quantities. These can be converted into "treacle," a superb flavouring and sweetening agent. Before the war "apple treacle" was eagerly bought up by confectioners at about 10s. a gallon. It can be used to sweeten and flavour almost all sweet dishes, and an expert cook with a supply can make a whole series of sweets hitherto unknown to her patrons and of the highest quality. The treacle produced by perry pears is scarcely distinguishable from that obtained from apples, but that from better varieties of pears should be so much the more exquisitely flavoured. The production of treacle from apples and pears is not a job for the housewife or the amateur, but it is done at a very reasonable cost by firms who make a specialty of this sort of work. The yield for average inferior sorts of apples is about 15 gallons a ton of fruit, and the cost of processing is quoted per ton. It ought not to be difficult in country districts to get together such quantities of apples and pears if one bears in mind that fruit for this purpose need not be of high quality or completely sound and whole. Treacle from carrots can be prepared, though the flavour is not nearly so pleasing, and it does not keep so well as that from apples and pears. At one time this spring carrots not of first quality could be bought at 50s. a ton. Such carrots would have paid handsomely for treacling.

Bleeding Tooth Sockets

Dr. J. T. MACLACHLAN (Dornoch) writes: During the last 50 years I have been twice called out of bed to stop bleeding tooth sockets. The usual styptics—iron, tannic acid, etc.—have failed in my hands to do so; and I have been obliged to plug the socket of the bleeding tooth with cotton-wool and to insert a horseshoe pad of Gamgee tissue between the teeth and tie the jaws together. This proved successful. The two interesting cases of bleeding after tooth extraction reported by Dr. G. E. H. Le Fanu (Aug. 15, p. 208), which were promptly cured by inserting a pencil of silver nitrate, will be greatly appreciated by practitioners. In a similar manner I have on one occasion stopped a bleeding nose, where the blood was spurting yards from the patient, by touching the bleeding-point on the septum with a caustic—silver nitrate. Recently I saw a man who had been struck on the mouth with the head of a golf club, displacing some teeth and lacerating the lower gum. In this case the few styptics that were available failed to stop the persisting welling-up of blood into the mouth, and I was compelled to use pads of cotton-wool in front, behind, and between the teeth, and to tie the jaws together. Prof. Grey Turner (Aug. 29, p. 258) has drawn attention to the valuable styptic power of turpentine in bleeding tooth sockets. Erichsen, in his classical work on surgery, drew attention to the great value of turpentine as a styptic; and he mentions a case of persistent bleeding from the tonsil that was successfully treated by a gargle of turpentine.

MEDICINE 100 YEARS AGO

Extract from a leading article in the *Provincial Medical Journal*, September 17, 1842:

"It appears, from the account which the *Times* gives of the accident and inquest, that the bodies of Burke and Carrol [two of four boys who had been exposed for several hours during the night to gases escaping from a lime kiln], being found deprived of circulation and respiration, were looked upon as quite beyond recovery, and no effort whatever was made to restore them to life. Now this was unquestionably a most unfortunate blunder, one which shows clearly, how dangerous it is that a practitioner should take the responsibility of cases, of such rare occurrence in this country, without availing himself of the advice of some gentleman, whose experience and knowledge of medical jurisprudence render it impossible that such an unlucky omission could occur.

"It is well known to persons skilled in legal medicine that, under proper treatment, persons recover from the deleterious effects of carbonic acid after many hours of exposure to the gas, and even after many hours' suspension of the circulation and respiratory movements, and it is laid down as a principle, that we should never despair of restoring animation until cadaveric rigidity is unequivocally established. If the limbs continue flexible, respiration should be imitated unceasingly for several hours (or until the occurrence of rigidity), by pressure made about twenty times in the minute upon the abdomen in the direction of the diaphragm, and simultaneously on the chest in the direction of the spine; these compressions should be assisted by the process called by the French, aspiration, which consists in *drawing air from the lungs* through a nostril-tube, and may be executed by the mouth of an assistant or by Weiss' stomach pump; thus a certain quantity of air will be withdrawn from the cavity of the chest about sixteen times in the minute, and an equal quantity of fresh atmospheric air drawn in when the capacity of the thorax is restored by natural elasticity. At the same time constant efforts should be made to stimulate the respiratory muscles, by galvanism, by the occasional dashing against the body of cold water if its temperature be natural, hot water (at 100° or 102°) if the temperature of the body be reduced, by careful drying and diligent friction after each affusion, and finally by flagellation, which proved so advantageous lately in a case of asphyxia from drowning reported by Dr. Ogier Ward, of Wolverhampton."